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EFFORT ALLOCATION AS EXCHANGE. FINAL REPORT.
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DESCRIPTORS- *COLLEGE STUDENTS, *SOCIAL EXCHANGE THEORY, COURSES, PROFESSORS, PEER RELATIONSHIP, SELF CONCEPT, STUDENT TEACHER RELATIONSHIP, *STUDENT MOTIVATION,

THE OBJECTIVES OF THIS STUDY WERE TO EXAMINE THE EXCHANGE PROCESSES PREDICTING DIFFERENTIAL ALLOCATIONS OF EFFORT AMONG STUDENTS' COURSES, AND TO EXPLAIN THE RELATIONSHIPS DISCOVERED. THE INVESTIGATORS BELIEVE THAT THE FOUR EXCHANGE SYSTEMS RELEVANT TO THE EFFORT-ALLOCATIONS OF STUDENTS ARE--(1) PROFESSOR-STUDENT, (2) COURSE-STUDENT, (3) PEER-STUDENT, AND (4) EGO-EXCHANGES. IT IS PROPOSED THAT THE TWO BASIC PRESSURES OPERANT IN EXCHANGE BEHAVIOR ARE--(1) PRESSURE TO ACHIEVE AN EQUILIBRIOUS RELATION WITH THOSE WHOM WE INTERACT, AND (2) ATTEMPTS BY INDIVIDUALS TO PROFIT BY PERSONAL BEHAVIORS. DATA ON 43 VARIABLES WERE COLLECTED BY MAGNITUDE ESTIMATION PROCEDURES FROM 260 COLLEGE FRESHMEN AND 269 SENIORS. RESULTS WERE--(1) FRESHMEN WERE LITTLE INFLUENCED BY PROFESSOR CHARACTERISTICS IN THEIR WORK ALLOCATIONS, (2) AMONG SENIORS, PERSONAL CHARACTERISTICS OF THE PROFESSOR AND PERSONAL ATTENTION FROM HIM WERE SALIENT PREDICTORS, (3) THE AMOUNT OF REQUIRED WORK PREDICTED AMOUNT OF EFFORT, (4) THE DIFFICULTY OF THE COURSE PREDICTED WORK ALLOCATION AMONG FRESHMEN, (5) MORE IMMEDIATE DEMANDS OF THE COURSE HAD MORE INFLUENCE THAN REMOTE VARIABLES, (6) THE AMOUNT OF WORK EXPECTED BY PEERS WAS A SIGNIFICANT PREDICTOR, AND (7) EXPECTATIONS OF SELF INFLUENCED WORK ALLOCATION. THE STUDY PROVIDES INDUCTIVE EVIDENCE FOR THE PROPOSED THEORY OF EXCHANGE. (PH)

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EFFORT ALLOCATION AS EXCHANGE

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CHAPTER I

Problem, Exchange Theory, and Related Literature

I. PROBLEM

It is no doubt true that students put more effort into some courses than into others.* But what is the basis of such differential allocation? Do they allocate their efforts simply on the basis of the amount of work required by the instructor? Do students work harder in some courses because they find the subject matter more interesting? Do peer influences significantly influence effort-allocation among students? And if, indeed, all these factors do contribute to how students will parcel out their limited resources, what is the relative contribution of each and, further, how would we explain this phenomenon? Even though we may be able to predict allocations empirically, the difficulty nonetheless remains of adequately explaining the relationships demonstrated.

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The substantive problem posed by this research is two-fold: first we will attempt to delineate the variables that predict differential effort-allocations among students' courses; and, second, we will attempt to explain the relationships so observed. The explanatory model that we will use will be that of exchange theory.

II. AN INTRODUCTION TO EXCHANGE THEORY

Although systematic exchange theory is still in its infancy, it does, nonetheless, offer exciting possibilities to the social scientist. Indeed, if a "theory of a phenomenon consists of a series of propositions, each stating a relationship between properties in nature,"[1] and if we also insist, as Homans does, that a theory must state the nature and the direction of the relation between variables, and that some of the propositions which form a deductive system must also be contingent--that is, amenable to empirical tests--then exchange theory may be the only theory (albeit primitive) that sociologists have managed to develop. Blau--and especially Homans--have attempted to build exchange theory so as to meet the criteria stated above. The potential power of such an approach to theory stems from its potential generalizability and from the fact that via axiomatic derivations one can arrive at new propositions. Such propositions, however, must be rigorously stated otherwise it is impossible to make meaningful deductions from them.

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[1] Braithwaite's approach to theory is also instructive. He defines theory as a "deductive system in which observable consequences logically follow from the conjunction of observed facts with the set of fundamental hypotheses of the system." (Cf. R. B. Braithwaite, Scientific Explanation, New York: Harper Torchbooks, 1960, p.22.) For Homans' conception of theory see George C. Homans, "Bringing Men Back In," American Sociological Review, 1964, pp. 809-18; and for his notions on exchange theory see "Social Behavior as Exchange," American Journal of Sociology, 1958, pp. 597-606; and Social Behavior: Its Elementary Forms, New York: Harcourt, Brace & World, Inc., 1961. Also see Peter M. Blau, Exchange and Power in Social Life, London: John Wiley & Sons, Inc., 1964.

The view that man is a reciprocating creature is not new to social science. As Gouldner has pointed out, Cicero, the famous Roman orator, philosopher, and politician, once noted that "all men distrust one forgetful of a benefit." Gouldner goes on to point out that Howard S. Becker, L. T. Hobhouse, Richard Thurnwald, Georg Simmel, George C. Homans, Claude Levi-Strauss, and Raymond Firth all have spoken of man as a reciprocator in his social interaction.[2] Many more names could be added to Gouldner's list. Certainly the names of Peter Blau, John W. Thibaut, and Harold H. Kelly must now be appended to his list.[3] And, in the history of social psychology, such names as Dashiell, Cottrell, and Sears deserve mention. The social psychologists' contribution has come in large part from their realization that the behavior emitted by other persons in a social situation will affect the behavior of the actor. Thus we get Cottrell's discussion of the 'double conditioning;'[4] Dashiell's notion that in a social setting the 'other' persons "are themselves stimulable and reactive; and so the stimulus-response relationship between the one individual and these social objects is likely to be a reciprocal affair."[5] More recently, some of the research being conducted in organizational analysis has made contributions to exchange theory; the names of such researchers as

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[2] Alvin W. Gouldner, "The Norm of Reciprocity: A Preliminary Statement," American Sociological Review, 1960, pp.161-62.

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[3] Peter M. Blau, op. cit.; John W. Thibaut and Harold H. Kelley, The Social Psychology of Groups, New York: John Wiley & Sons, 1959.

[4] Leonard S. Cottrell, Jr., "The Analysis of Situational Fields in Social Psychology," American Sociological Review, 1942, p. 374.

[5] J. F. Dashiell, "Experimental Studies of the Influence of Social Situations on the Behavior of Individual Human Adults," in C. Murchison (ed.), Handbook of Social Psychology, Worcester, Mass.: Clark University Press, 1935, p. 1097.

Adams,[6] Levine and White,[7] Levinson,[8] Schwartz,[9] and Gouldner merit attention.[10]

In our introductory presentation of exchange theory, we will simply indicate some of the core ideas of the theory. A detailed discussion and a modest extension of the theory will be presented in Chapter II. The basic notions of exchange theory may be stated in terms of social actors reciprocating with one another so as to maximize self-interests. In general, exchange theory predicts that people act and react to one another so that all profit by the interaction. And interaction will persist, (other things being equal, of course) only to the extent that the various actors find that they are profiting by by their behaviors. Thus if person A can provide valued behavior to another person, B, and if B can reciprocate by providing valued attributes to A, then we would predict that the interaction would tend to persist through time. Gift-giving, as analyzed in the anthropological literature, would appear to indicate that most gifts have, as it were, strings attached to them. If one examines the individual's (or group's) gifts in the exchange, one generally finds that the gift, if not returned in kind, will serve in some way to make the exchange profitable for both sides. It may serve, for example, to solidify the relation between two groups and hence protect one group from the other. But we must not make the mistake that Thurnwald has in assuming that reciprocity is always just and returned in kind:

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[6] J. Stacy Adams, "Inequality in Social Exchange," in L. Berkowitz, Advances in Experimental Social Psychology, New York: Academic Press, 1965, pp. 267-99.

[7] Sol Levine and Paul E. White, "Exchange as a Conceptual Framework for the Study of Interorganizational Relationships," Administrative Science Quarterly, Vol.5, pp. 583-601.

[8] Harry Levinson, "Reciprocation: The Relationship Between Man and Organization," Administrative Science Quarterly, Vol.9, pp. 370-390.

[9] Michael Schwartz, "The Reciprocities Multiplier: An Empirical Evaluation," Administrative Science Quarterly, Vol.9, pp. 264-77.

[10] Alvin W. Gouldner, "Organizational Analysis," in Robert K. Merton, Leonard Broom, and Leonard S. Cottrell, Jr., (eds.), Sociology Today. New York: Basis Books, Inc., 1959, pp. 400-428.

> The idea that the person receiving his or her share will be ready to-morrow to give the same to the distributor to-day. To-day's giving will be recompensed by to-morrow's taking. This is the outcome of the principle of reciprocity which prevades every relation of primitive life and is exemplified in many other ways.[11]

Firth has emphasized that in some exchanges that "whatever be the quantitative effect, the emphasis is laid upon the act of return rather than upon the quantity or quality of the goods returned."[12]

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[11] Richard Thurnwald, Economics in Primitive Communities, London: Oxford University Press, 1965, p. 106.

Let us briefly examine what would appear to be three fundamental weaknesses that plague contemporary exchange theory. First--and most glaring of all--is a notable paucity of empirical evidence that has been specifically gathered to test the propositions of the theory. But we must remember that as a systematic theory about human behavior, exchange theory is in its formative stages and hence it is understandable that the rigorous tests of its propositions have yet to be performed. To verify and to further refine it, however, much research will be required.[13]

In the second place, no good answer has been provided to the question as to why people enter into and maintain exchange relations. Is it because of some instinct to maximize pleasures, or is it, as Durkheim and Gouldner would seem to suggest, that man enters into such relations because he is conscious of his dependence upon others?[14] How is it that man's egoism is modified so that viable social patterns can emerge? Indeed, the Hobbesian problem of why we do not have war of all against all is still problematic. Perhaps the concepts of reinforcement and of socialization will prove helpful in answering this question--or, if not providing a satisfactory answer, at least providing a useful lead. To account for the modification of man's egoism, it could be argued that a distinction between origin structures and maintenance structures needs to be introduced. We would argue that the origin of exchange relations fall into the realm of 'arm-chair anthropology' and need not be raised here. It is the once-established, on-going exchange relations that are of significance to understanding such relations. Briefly, it could be argued that upon entering the world, the child has a complex of physiological needs. Hunger and the need for warmth might be said to constitute the basic two. Through the constant pairing of the need-reduction (or need-satisfying) stimuli with, for example, mother's affection, the child through time comes to find that mother's affection in and of itself becomes positively reinforcing. In the simple case, then, when societal norms are communicated to the child, and if the child is rewarded for obeying them (or, indeed, punished for disobeying them), either by the mother's affection or some other secondary reinforcer, then the child will come to accept norms simply because social rewards are contingent upon their acceptance. If there is such a thing as a 'norm of reciprocity' it may well rest on the socialization process where people are reinforced for reciprocating, punished for not reciprocating. To earn the rewards of the social environment reciprocation is necessary.

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[12] Raymond Firth, Primitive Polynesian Economy, New York: The Humanities Press, 1950, p. 313.

[13] To date most of the exchange theorists' work has been concentrated on reinterpreting other research as studies in exchange. And, given the fact that exchange theory is quite general in its application, it is no surprise that a good deal of convincing work has been done along these lines. The works of Homans and Blau (*op. cit.*) are sufficient to illustrate this point. One of the few empirical studies completed and *directly* testing one of Gouldner's concepts, is that of Michael Schwartz (*op. cit.*).

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[14] Emile Durkheim, The Division of Labour in Society, Glencoe: The Free Press, 1964, esp. pp. 233-352; Alvin W. Gouldner, "The Norm of Reciprocity," op. cit.

Finally, on both the theoretical and the empirical sides, no attempt has yet been made to deal with the fact that man simultaneously performs in multiple exchange systems. And each of these has anticipated and actual consequences for him. A viable exchange theory will have to take into account these various exchange systems. Furthermore, it will probably be necessary to include within our exchange formulations, the notion of ego-exchanges and exchanges with the non-social environment.

III. THE SOCIOLOGICAL CONTRIBUTION OF EXCHANGE THEORY

Social scientists, on looking at the writing of the exchange theorists, might understandably ask the question, "Well, what does this add to Skinnerian psychology? Certainly there are important and unmistakable convergencies between operant conditioning and exchange theory (this similarity is particularly apparent in the work of George C. Homans). But there are also differences, and those are to be noted, for they constitute the distinctive sociological elements of the theory. The exciting possibility of exchange theory is that it may well provide a stronger link between psychological and sociological thinking and research.

As a preliminary, and doubtlessly incomplete, statement of the differences between operant conditioning and exchange theory, the following points might be raised for discussion:

(a) Subject Matter. Operant conditioners have mainly concerned themselves with such processes as satiation, deprivation, and the effects of various types of reinforcement schedules. Such research has focussed on individual organisms, both human and sub-human. Exchange theorists have been more concerned with interaction--the relations between two or more people--and have focussed attention on the processes that surround such relations.

(b) A Concern With Both Sides of the Exchange. As suggested above, exchange theorists have concerned themselves with both sides of an exchange; the operant conditioners, on the other hand, have generally focussed on one side of the exchange--that of the experimental subject. This does not mean, however, that the psychologists were not aware of the so-called 'double conditioning' process.

(c) Revisions of Old Concepts. Exchange theorists may well come up with important criticisms of operant conditioning principles. One concept that no doubt will come under attack will be the operant conditioners' notion of the importance of the immediacy of reinforcement in conditioning. In dealing with human affairs this may not always be the case. One of the peculiarities of man (often wrongly attributed to elephants!) is that they have a long memory. An act committed now, and rewarded or punished much later, may have consequences for his later behavior, providing that the connection between act and consequent is made by the person.

(d) The Macro-Level and the Complex. With the addition of more variables, and with the development of research which deals with exchanges between systems as well as between people, it should be possible to examine macro-level phenomena. One interesting study already conducted along these lines is that of Sol Levine and Paul E. White in their investigation of the interrelations between community health and welfare agencies.[15]

(e) An Explanation. Richard Braithwaite has pointed out that any psychologically satisfying answer to the question 'why' is an explanation of sorts.[16] While we may not be satisfied with any response that satisfies some people as an adequate explanation the argument could be developed that one must go beyond the empirical level to find explanation. Thus, merely to be able to predict one event from another does not necessarily mean that we can offer a meaningful explanation of the relation between the two events. Hopefully, exchange theory can offer convincing explanations of a good deal of human behavior.

IV. LITERATURE RELEVANT TO EFFORT-ALLOCATIONS OF STUDENTS

Little reported literature deals directly with the substantive problem raised by this research; i.e., the variables that predict the amount of effort students put into their various courses. Why, in short, does a student work twice as hard in one course than in another? The first job in finding answers to this question will be in locating variables that will predict such differential allocations. A survey of the literature indicates that a few studies can be related to both the theoretical interests of this research as well as some which bear indirectly on its substantive problem.

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[15] Sol Levine and Paul E. White, "Exchange as a Conceptual Framework for the Study of Interorganizational Relationships," *op. cit.*

[16] Richard B. Braithwaite, *Scientific Explanation*, New York: Harcourt, Brace, and World, Inc., 1961, pp. 20-26.

In dealing with the question of the influence of teacher attributes on students' behavior and achievement, Freymier has reported that students perceive the teachers to be important in motivating them to do good work.[17] Thus, at least at the perceptual level, students find teachers to be relevant to motivating students. Research by Page,[18] Wallen,[19]

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[17] Jack R. Freymier, "A Study of Students' Motivation to do Good Work in School," Journal of Educational Research, Vol. 57 (1964), pp. 239-44.

[18] E. Page, "Teacher Comments and Student Performance: A Seventy-Four Classroom Experiment in School Motivation," Journal of Educational Psychology, Vol. 49 (1958), pp. 173-81.

[19] Carl J. Wallen, "Teacher, Individual, and Group Issued Incentives and Pupil Performance: A Nineteen Classroom Experiment in Motivation," Journal of Educational Psychology, Vol. 16 (1925), pp. 145-59.

Hurlock,[20] and Sears[21] all have reported that the presence of positive incentives will induce students to perform more efficiently. In Page's study--and one which could easily be translated into exchange theory terms--it was found that students performed at higher levels when the teacher wrote brief comments on papers returned to students than when papers were returned with no comments and having only letter grades on them. And, in a somewhat similar vein, Bostrom, Vlandis and Rosenbaum[22] have reported that grades themselves can affect changes in students' attitudes. They found that if they reinforced an attitude expressed in an essay with a high grade, they could increase the importance of this attitude to the student; similarly, if they punished a student with a low grade for expressing a certain attitude, the student was apt to modify his attitude.

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[20] E. Hurlock, "An Evaluation of Certain Incentives Used in School Work, "Journal of Educational Psychology, Vol. 16 (1925), pp. 145-59.

[21] R. Sears, "Initiation of the Repression Sequence by Experimental Failure," Journal of Educational Research, Vol. 20 (1937), pp. 570-80.

[22] Robert N. Bostrom, John W. Vlandis, and Milton E. Rosenbaum, "Grades as Reinforcing Contingencies and Attitude Change," Journal of Educational Psychology, Vol. 52 (1961), pp. 112-115.

A study by Rosenfeld and Zander on the influences of teachers on the aspirations of students comes close, in some respects, to the research reported in this study. They examined various attributes of teachers and related these to the aspirations of students. While they were not specifically concerned with the question of how students differentially allocate their efforts among their various courses, nor were they concerned with the variables which influence such allocations, but they were interested in determining levels of aspirations students held about doing well in their various courses. The researchers found that teachers who employed coercive power to influence their students were the least successful in motivating their students to want to do well.[23] Students, apparently, exchange desire to do well for favoured teacher attributes.

In a study conducted Christensen, it was found that the perceived 'warmth' of a teacher was significantly related to the achievements of the students.[24] Like the previous study cited, his could be interpreted as providing indirect support for an exchange theory explanation of the relation between students and teachers. To the extent that students perceive a teacher to be warm, they work hard for such teachers--exchanging, as it were, hard work (and, presumably, achievement) for the interest shown by the teacher.

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[23] Howard Rosenfeld and Alvin Zander, "The Influence of Teachers on the Aspirations of Students," Journal of Educational Psychology, Vol. 52 (1961), pp. 1-11.

[24] C. M. Christensen, "Relationships Between Pupil Achievement, Pupil Affect-Need, Teacher Warmth, and Teacher Permissiveness," Journal of Educational Psychology, Vol. 51 (1960), pp. 21-25.

One study of importance--but which unfortunately was not located until our study was designed and the data collected--is a dissertation by Morris L. Cogan.[25] One of the problems to which he addresses himself is the relation between teacher traits (_inclusive_, _preclusive_, and _conjunctive_) and a cohort of eighth grade students' perception of the amount of required and self-initiated school work that they do in their various courses. Cogan found evidence to support the hypothesis that inclusive and conjunctive behavior traits are positively related to the performance of student work; he did not, however, find sufficient evidence to permit him to accept the hypothesis that preclusive behavior traits would be negatively associated with work behavior of both the required and self-initiated varieties.

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[25] See Morris L. Cogan, "Theory and Design of a Study of Teacher-Pupil Interaction, " _Harvard Educational Review_, Vol. 26 (1956), pp. 315-42; "The Behavior of Teachers and the Productive Behavior of Their Pupils: I. 'Perception' Analysis," _Journal of Experimental Education_, Vol. 27 (1958), pp. 89-105; and "The Behavior of Teachers and the Productive Behavior of Their Pupils: II. 'Trait' Analysis," _Journal of Experimental Education_, Vol. 27 (1958), pp. 106-124.

Despite the careful design of his research, Cogan does not go so far as to enable us to predict student work behavior on the basis of the variables he examined. While he has demonstrated the existence of a positive correlation between certain teacher attributes and student behaviors, we have no way of making inferences about the casual magnitude of these variables. Furthermore, no consideration was given to the influence peers might have on the work behaviors of students.

Since our research deals with college students, a paper by Clark H. Weaver is also pertinent.[26] He found that student's evaluations of instructors were directly related to how well the students expected to do in each of their courses. In other words, if the student expected a good grade in a course, he tended to give a higher evaluation of that course's instructor. An interpretation of Weaver's findings might well be that students, in fact, exchange high evaluations for a good grade. Another finding reported by Weaver was that the most important characteristics of professors, so far as eliciting high evaluations from the students, were his teaching skills and not his personality characteristics.

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[26] Carl H. Weaver, "Instructor Rating of College Students," Journal of Educational Psychology, Vol. 51 (1960), pp. 21-25.

Having briefly introduced the subject matter of the research that is reported in this thesis, let us now turn our attention to an examination of the theoretical model that will be used.

CHAPTER II

Exchange in Human Behavior

I. INTRODUCTION

In this chapter we will propose some modifications to existing exchange theory. The hope is that such elaboration will lead to a more fruitful understanding of the dynamics of human behavior in general, and a better understanding of the way in which students allocate their energies in particular. We will begin with a few concepts, some old and some new.

II. KEY CONCEPTS

For purposes of discussion we will conceive of the individual as possessing two components--an acting self (engaging in behaviors and feeling sentiments) and a conscious self (the actor's awareness of his attitudes and feelings). The reason for this distinction is that we would argue that in human behavior, and particularly in reciprocating behavior, that actors are influenced both by the behavior of others and by their expectations of these behaviors as well as by their own attitudes and feelings. While we will hold to a distinction between the acting self and the conscious self, we will not make any precise distinctions between such terms as actor, self, person, ego, or individual. All of these terms will be used interchangeably.

By *exchange we refer to those actions or sentiments which are emitted or felt by actors and which have a tendency to push toward a maintenance of profit equilibrium with other actors, or to those actions or sentiments that lead to harmony of the internal states of the individual actors.* Such exexchanges will refer to three classes of behavior: exchanges with the self, exchanges with other humans, and exchanges with the non-human environment.[1] Since it may well be that human behavior can be reduced to the individual level (although an understanding of group process and structure may be necessary for an understanding of individual behavior) all the exchanges that we will discuss will have minimally one component represented by the ego. Let us briefly examine the three classes of exchange behavior that are possible.

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[1] For the present our classification does not include exchanges between social groupings. The reason for this omission is that such considerations are not relevant to the research that will be reported here. There is no reason, however, that extensions to macro-sociological systems could not be made.

Ego-Exchanges. At first sight, the evidence of the cognitive dissonance research would seem to point to a fundamental weakness of exchange theory--specifically, an inability to deal with the ego exponent of interaction and particularly differential value orientations and the conflict that may exist between actions and attitudes. One concept added to the exchange theorist's repertoire would seem to help alleviate this problem. This concept is that of ego-exchanges, or exchanges with the self. To illustrate what is meant, think of the dilemma of a man who strikes his child for being naughty. While striking the child may have permitted a release of his frustrations with the child, he nonetheless has to resolve any conflict that there might be against his action and his values. Suppose he holds a strong value against bullying: he is now faced with a conflict. In terms of this value, his behavior is dissonant with his value, and therefore would be perceived as being punishing to the man (other things being equal, of course). On reflection, he might think that he should have sent the errant child to its room instead of striking him--a thought which would serve to add further costs to his original action. On the other hand, he might be able to locate a ready justification in some maxim as 'spare the rod and spoil the child.' At this point, his behavior would be consonant with his belief, and thus would experience a reduction in the cost of his behavior. In short, an individual's actions may be consonant or dissonant with his own self-image and values. We would argue that those actions which are consonant with one's self-image are perceived as positively reinforcing to the individual. The cognitive dissonance theorist's findings now become special cases of exchange theory--those in which the value of the self-exchange outweigh those outside the individual.[2]

Human Exchanges. By human exchanges we refer to transactions between individuals where each of the components attempts to profit by the interaction and where, consequently, a profit equilibrium tends to be approximated. If such equilibrious relations are not achieved, the pattern of interaction will tend to deteriorate. In all such exchanges, ego-exchanges will be going on simultaneously. To go back to the illustration used previously: while the father who is beating his child is engaging in exchanges with himself, he is, of course, engaging in an exchange (albeit a hostile, negative one) with his child. We will discuss some propositions relating to such exchanges at a later point in this chapter (see pp. 38-48).

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[2] For a presentation of the theory of cognitive dissonance see Leon Festinger, A Theory of Cognitive Dissonance, Evanston, Ill.: Row, Peterson, 1957.

Non-Human Exchanges. By non-human exchanges we refer to exchanges in which only one party in the exchange is human and where the other component in the exchange is some sub-human or some inanimate object, or situation. To the extent that the environment reacts to our behavior we may speak of non-human exchanges. Thus when a typist strikes a key of her typewriter, and the machine responds by printing the letter struck, we have a case of a non-human exchange. Similarly, we might think of a person reading a book; by reading, ideas may be conveyed to the reader and hence one may think of the reader as engaging in an exchange with the book. Many of the propositions that hold for the human exchange situation will also be found to hold equally well for the non-human exchanges.

In an attempt to deal with the possibility that equilibrium may be achieved by both direct and indirect means, we introduce the concepts of primary and secondary exchanges.[3] Equilibriating processes may be going on even though the components in the exchange may not be aware of them. That is, some exchanges involve communication between the parties in the exchange, others do not involve such communication. We now have six possible kinds of exchange relations. (See Figure 1., p. 25.)

By secondary exchange we refer to those exchanges in which the behavior (or sentiment) is not communicated to the other component in the exchange. Thus an individual may hold a sentiment of hatred toward another, yet so long as he does not communicate it, this part of the exchange remains at secondary level. Ordinarily exchanges with both the human and non-human environment involve, simultaneously, exchanges with the self. That is, in all exchanges there is an ego component. To achieve equilibrium (or avoid dissonance) in a costly exchange, an individual may, for example, balance his losses in the exchange by developing an attitude of dislike toward the other person or object. The costs of expressing such disliking may be too great, with the result

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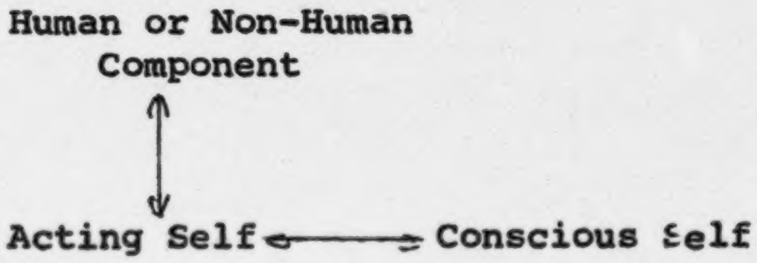
[3] Peter M. Blau in Exchange and Power in Social Life, op. cit., has used the concepts of direct and indirect exchanges. However, since the meaning which we intend is slightly different from his, we will use the concepts of primary and secondary exchanges.

Figure 1. Six Types of Exchange Relationships

	Primary Exchange	Secondary Exchange
Ego-Exchange		
Human Exchange		
Non-Human Exchange		

that the individual simply contains his feelings within himself or only communicates it to other people. Simultaneously, all exchanges would seem to involve the acting self (what the individual does) and the conscious self (what the individual thinks, feels) as well as the other human or non-human component. Hence we could diagram an exchange in the following way:



In the case of ego-exchanges, only the bottom half of the diagram would apply. Such exchanges are present, however, in all exchanges.

Primary exchanges refer to those in which behaviors are emitted, communicated, and acted upon by the other component in the exchange. Thus if an individual strikes the key of a typewriter (to take the non-human exchange as an illustration), it will respond by printing the letter struck. The exchange here is direct. Similarly, if I call a colleague a dirty name and he punches me in the nose, we have an illustration of a primary human exchange. Of the more difficult types of exchanges to imagine are the ego ones of the primary and secondary types. We would argue, however, that an ego-exchange of the former variety would involve any consciously held attitude, belief, or behavior emitted of which the individual is aware. The other class of ego-exchanges--the secondary ones--refer to those beliefs, attitudes, values, or behaviors which are emitted (or expressed) but of which the individual is not conscious. Such exchanges may have consequences for the individual's behavior, yet, as in the case of secondary exchanges, there is no communication between the two parties in the exchange (the acting self and the conscious self).[4]

It is to be noted here that we do not limit ourselves to what Blau and Homans refer to as 'social exchanges;' instead we have broadened our formulation to include exchanges with the self, the non-human elements, and exchanges with other humans. Many of the concepts of exchange theory therefore have to be modified to fit with our broadened conceptualization. The notion of interaction, as used here, will refer to exchanges with the self, with any non-human components, and exchanges with other humans. Thus, we will define _interaction as those activities or sentiments that are emitted, or felt, by one man and that, as a consequence, are rewarded or punished by an activity engaged in by one's self, another man, or by the non-human environment_.[5] Interaction may be conscious or unconscious from the point of view of any of the components in the exchange system--each may, or may not, be conscious of the behaviors, or the consequences of the behaviors that it emits. That class of behaviors sometimes labeled as 'inadvertent exchanges' refer to those in which there is a failure on the part of the components in the exchange to recognize that an exchange is taking place or a failure to see the connection between one's acts and the responses that one is getting for engaging in certain behaviors.

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[4] Our distinction here is not, of course, dissimilar from George Herbert Mead's distinction between the 'I' and the 'me.'

We would posit, in addition, that an important characteristic of human behavior is that it takes place typically in a vast field of competing response forces. That is, many exchange systems enter into and affect one's allocations of responses at any given time. Thus an individual has various cross-pressures playing on him. The profits achieved in one exchange system may well turn out to be the costs in another. Any human behavior may have consequences for various exchange systems simultaneously; as a result, there are constant cross-pressures playing on him--pushing and pulling him to and away from acting on any one way. Thus another concept we will employ in our formulation of exchange theory will be that of cross-pressures which we will define as the pushes and pulls--the attraction and repulsion--of emitting any behavior involving a psychic calculus as to the profits and costs of emitting specific behaviors in the various exchange systems for which the behavior will have consequences.[6]

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[5] The definition of 'interaction' is a modified version of the one employed by George C. Homans in his _Elementary Forms_, _op_. _cit_., p. 35.

One key concept employed by exchange theorists is that of equilibrium. In examining human behavior they have concluded, like many of the functionalists,[7] that there is a tendency toward equilibrium in social relations. They do not maintain, however, that a static equilibrium is ever attained nor do they deny the importance of disequilibrium in human affairs. Equilibrium, as used in this paper, refers to a state where the profits of the components are equal, or nearly so. Equilibrium may exist in extremely unequal exchanges. A person may completely dominate another, refusing to provide any equality in the exchange. On the surface it would appear that such a relation is not equilibrious. However, it may well be that the individual on the 'wrong end' of the exchange spreads nasty rumors about his oppressor and thus, through secondary exchange, is able to achieve a semblance of equilibrium in the exchange; he may, in fact, be receiving a profit; he may derive great satisfaction from knowing that he is really harming his oppressor.

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[6] The 'psychic calculus' referred to in our definition of cross-pressures is similar in many ways to Jeremy Bentham's notion of "moral calculus," discussed in Theory of Legislation, translated from the French of E. Dumont by C. M. Atkinson, Oxford: Clarendon Press, 1914, Vol. I, pp. 1-5 and 42-43.

[7] According to Alvin W. Gouldner in his article, "Reciprocity and Autonomy in Functional Theory," in Llewellyn Gross (ed.), Symposium on Sociological Theory, Evanston, Ill.: Row,

In our analysis we assume that the force that presses toward equilibrium in human interaction is that the various components in exchanges attempt to profit by their actions. (Here we do not include non-human components which, for the

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Peterson, 1959, p. 242, the notion of equilibrium is at the basis of all system analysis.

most part, cannot attempt to make profits.)[8] As used by Homans, profit has two components: cost and reward. Profit is defined as reward minus cost.[9] The magnitude of a reward depends on the "pleasures, satisfactions, and gratifications the person enjoys."[10] Furthermore, according to Thibaut and Kelley, the "provision of a means whereby a drive is reduced or a need fulfilled constitutes a reward."[11] Similarly, costs are "any factors that operate to inhibit or deter the performance of a sequence of behavior."[12] But it is also important to remember that activities not emitted are also costs to the extent that their emission would have brought about rewards. Further, it is to be noted that rewards are often ego-specific. That is, what is valuable for one man may not be valued by another; and further, the interplay of the self, inter-human, and non-human exchanges along with the primary and the secondary dimensions of these exchanges indicate that there are many ways in which profit equilibrium may be approximated in human interaction. Just as the psychologists have indicated that there is a pressure toward consistency between human actions and attitudes, so, too, in human exchanges we would argue that there is a tendency for the participants to receive an equitable profit for their investments. Indeed, we may conceptualize human behavior as stemming from a press toward psychic profit in exchanges. The individual actor attempts to achieve a profit from his interactions; he tries, as it were, to gain the greatest rewards for his actions and to minimize his costs.

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[8] Exceptions might be cited in the case of human interaction with sub-human species who very well may attempt to maximize their pleasures by engaging in certain behaviors. The dog that stands up on its hind legs may certainly anticipate the gastronomic rewards of its master.

[9] Homans, The Elementary Forms, op. cit., p. 112-15.

[10] John W. Thibaut and Harold H. Kelley, The Social Psychology of Groups, New York: John Wiley & Sons, 1959, p. 12.

[11] Ibid.

[12] Ibid.

Another force that presses toward equilibrium in human relations is what we might refer to as the reciprocity pressure. By this we refer to the possibility that if one individual is in debt to another then we would argue that there is a pressure for the individual to reciprocate and to decrease the debt. In short, individuals reciprocate to minimize the disequilibrium and to preserve the exchange. The explanation of this phenomenon may well lay in the socialization process. In general, it is probably reasonable to assume that we reward individuals who reciprocate, punish (through ignoring them or using some other sanction) those who do not obey this norm. The emergence of such a norm could be explained through childhood socialization for particular behaviors and the later generalization of this norm. Where there is great indebtedness between persons we may predict that efforts will be made to equilibriate the system.

An important concept of operant conditioning is that of reinforcement. Generally, the definition of reinforcement takes an empirical form such as: "When an increase in the response rate occurs we know the stimulus to be a positive reinforcer; when we get a decrease in response rate, we know the stimulus to be a negative reinforcer."[13] In general, reinforcement is thought of as stemming from any stimulus that has consequences for the organism. In operant conditioning--as distinct from respondent or classical conditioning--the valued stimulus (positive reinforcer) follows a certain action (or operant) and through some schedule of pairing a valued stimulus with an operant, the probability of the emission of the operant is found to increase. The process of classical conditioning, on the other hand, depends upon the pairing stimuli which precede the behaviors.

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[13] Sidney W. Bijou and Donald M. Baer, Child Development I: A Systematic And Empirical Theory, New York: Appleton-Century-Crofts, Inc., 1961, p. 36.

By translating the principles of operant and respondent conditioning to human interaction, and to social systems, a good deal can be postulated about human behavior. If positive reinforcement leads to an increase in the frequency of the emission of specified behavior, we can then build a systematic theory of human behavior. But at each stage in the development of such a theory, rigorous empirical tests of its propositions will have to be made.

Before preceeding to a discussion of the specific problem with which our research deals, let us briefly recapitulate our major concepts.

We have argued that there are two fundamental types of exchanges: the primary and the secondary ones. Although a secondary exchange involves no two-way communication between the components in the exchange, or even any positive or negative reinforcement for the behaviors being emitted (save, the reinforcement of achieving consonance), it nonetheless remains true that the actions of one of the components may have important effects upon the other component--even though that component may not show it. The person, for example, who develops hatred for another may not communicate this feeling directly but he may, as an alternative, express his feelings to his friends and in this way exchanges the aversive stimuli presented by the object of hate for a negative evaluation of this object to his friends. At the cognitive level, the exchange achieves some semblance of equilibrium in this way.

We have argued, further, that people attempt to make profits by their behaviors--that is they attempt to earn as many rewards and incur as few costs as possible in their behavior. And since we assume that most people behave according to this rule, we would expect that over time the profits of one party in an exchange will tend to equal the profits of the other components. The complicating factor in all of this thinking is, however, that people are at least potentially involved in many exchange systems simultaneously. These competing exchange systems may press the individual toward some behavior or they may be the basis for numerous cross-pressures.

Besides there being a pressure on behavior stemming from the rewards the individual has previously received for engaging in certain behaviors, there is also a pressure created by social indebtedness. If someone has provided me with valued rewards then I am under some pressure to reciprocate--a pressure to bring the exchange into an equilibrious relation. Thus for the phenomenon under investigation, we would suggest that if a professor presents brilliant lectures to his students, the norm of reciprocation would suggest that there will be some pressure to bring the system of exchange into an equilibrious relation. The students may reciprocate by working hard for the professor, they may say good things about the professor to their friends, they may attend lectures regularly, they may show the professor respect. Through both _primary_ and _secondary_ exchanges the students may be able to bring the exchange relationship into an equilibrious state.

If it is true that a broadened conceptualization of exchange theory can account for most human behavior, then it should be possible to examine any particular behavior and with good measurement, the inclusion of the relevant variables, and the proper method of analysis, be able to account for most of the variability for that behavior.

III. THE PROBLEM

As outlined in Chapter I, the problem with which this research is concerned is to account for how students' allocate their efforts among their various courses. There would appear to be four major exchange systems relevant to this question: these are professor-exchanges, peer-exchanges, ego-exchanges, and exchanges with the courses themselves. Treating exchanges with the courses as an exchange system presents some difficulties: in some cases, course requirements would seem to constitute the contingencies of the exchange with the professor, while in other cases, the course would appear to operate as a separate exchange system. Thus, if the subject matter of the course is relevant to the career goals of the student this would appear to be a case of a course constituting an independent exchange system. However, the amount of work required in a course is mediated by the professor. It would seem, then, that the course constitutes both an exchange system and is part of the contingencies of the exchange with the professor. Peer-exchanges may be relevant to effort-allocations among courses in the sense that peers may have certain norms as to how much work ought to be done in each course. The self-exchanges can be thought of as referring to a student's self-concept--a certain expectation a student has of himself. If a student perceives himself to be one of the best students in a class he may well work hard so as to preserve the balance between his perception and the subsequent grade that he receives in the course.

What is particularly problematic is the relative contribution of each of the exchange systems for the allocation of student efforts. Do exchanges with the professor almost entirely account for the allocation of student efforts? Are peer expectations relevant here? Is the individual's self-concept important in determining how a student will parcel out his time and efforts? No doubt we will find that various cross-pressures will bear upon the student. While a student may wish to exchange hard work in a course for his professor's approval (or good grades) he may, by so doing, have to endure the costs of peer rejection for his meritorious academic performance.

IV. PROPOSITIONS RELATING TO THE ALLOCATION OF STUDENT EFFORT

To provide ourselves with a starting point for discussion, let us examine Homans' five general propositions concerning social exchanges; we will then consider some additional propositions that have been developed out of our attempted extension of exchange theory. For each of the propositions, we will discuss its implications for the present research. Homans' first proposition is as follows:

> PROPOSITION I: If in the past the occurrence of a particular stimulus-situation has been the occasion on which a man's activity has been rewarded, then the more similar to the present stimulus-situation is to the past one, the more likely he is to emit the activity, or some similar activity, now.[14]

What Homans is suggesting here, is that if, in the reinforcement history of the individual, he has experienced rewards for behaving in certain ways, then he will continue to behave in these ways, or in some similar way, when presented with similar stimulus-situations. Take the case of the student. In the past he may have found that by doing good school work that he earned much approval from his family, peers, and teachers. Thus we would expect that such a student, when assigned some homework, would work hard--attempting, as it were--to once again earn the valued approval.

Homans' second major proposition states that:

> PROPOSITION II: The more often within a given period of time a man's activity rewards the activity of another, the more often the other will emit the activity.[15]

If a professor were to pay a student a compliment every time the student came to ask a question, we would predict that the frequency of the student's visits to his professor's office would increase.

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[14] Homans, The Elementary Forms, op. cit., p. 53.

[15] Ibid., p. 55

Homans' third proposition is a variant of the second but which takes into account the value placed on the reward:

> PROPOSITION III: The more valuable to a man a unit of activity another gives him, the more often he will emit activity rewarded by the activity of another.[16]

Here we might deduce that if, for example, a student values a professor's approval, the more he will work to earn it. Similarly, if a student values peer approval and if the norms of his peers specify that one should not work hard for a professor, then we would predict that the cost of working hard for the professor would go up and therefore any hard work activity on the part of the student would tend to decline. Here again we would have to introduce the notion of cross-pressures to evaluate the ultimate outcome of the student's work behavior.

Working in the opposite direction of the above two propositions is Homans' fourth proposition:

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[16] Ibid., p. 55.

> **PROPOSITION IV**: The more often a man in the recent past received a rewarding activity from another, the less valuable any further unit of that activity becomes to him.[17]

This might be referred to as the 'satiation effect.' Suppose that a student has been highly rewarded by his professor for doing an excellent paper, we would then expect that the value of the professor's rewards would temporarily decline. Simiarly, a student who has just received a great deal of approval from his peers for his athletic prowess, may become temporarily satiated on such approval and therefore attempt to earn approval, or other valued responses, in the other exchange systems in which he is involved.

A recent paper by Ellis and Hamblin presented an exchange model which is a useful way of summarizing, and expanding on, Homans' first four major propositions.[18] (See Figure 2., p. 42.)

The model presented by Ellis constitutes an extension of Homans' work in that it proposes that the connection between the P_{OR} (subjective probability that the operant will result in reciprocation) and the V_R (the value of the recipro-

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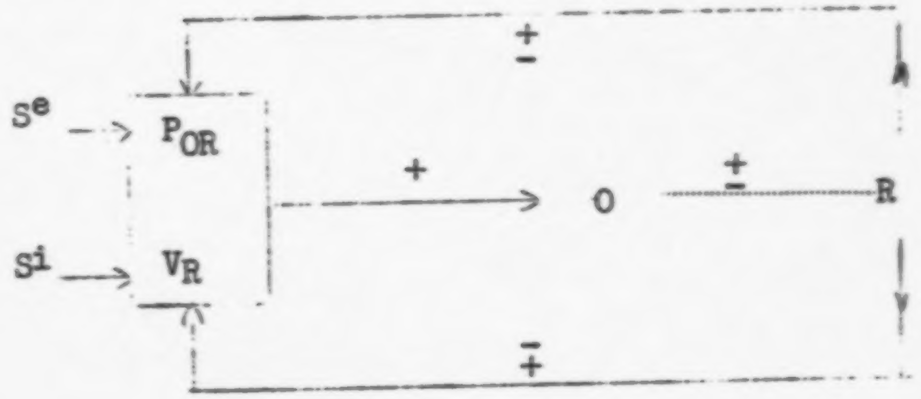
[18] Desmond P. Ellis and Robert L. Hamblin, "Programmed Exchanges and the Control of Aggression," Final report, Project 6-8138, U. S. Office of Education, Bureau of Research; Social Science Institute, Washington University, St. Louis, Mo., 1966, p. 5-6.

Figure 2. The Ellis-Hamblin Exchange Model



Where:

S^e is an exchange stimulus;
Si is an instigating stimulus;
P_{OR} is the estimated probability that emission of operant (O) will result in reciprocation (R) under S^e condition;
V_R is the estimated value of the reciprocation (R);
O is the operant or that which the subject uses in the attempt to initiate an exchange for R;
R is the reciprocation of the other component in the system;
are automatic or respondent relationships;
indicates that O may (+), or may not (-) produce the exchange for R;
± and ∓ on the feedback loops show the reinforcing (or extinction) and the satiation (or intensification) effects for valued reciprocation (or non-reciprocation).

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*Desmond P. Ellis and Robert L. Hamblin, "Programmed Exchanges and the Control of Aggression," Final Report, Project 6-8138, U. S. Office of Education, Bureau of Research; Social Science Institute, Washington University, St. Louis, Missouri, 1966, pp. 5-6.

cation) will be linked in a multiplicative relationship. Two limitations of the model is that (1) it does not _explicitly_ take into account the fact that actors may be simultaneously acting in numerous exchange systems; and (2) it does not make explicit how one would operationalize all the variables in the model. Another difficulty is that in attempting to analyze any one behavior, one has to be aware of the fact that many different types of exchanges may be engaged in and hence if one attempts to predict one type of behavior, difficulties may well arise. We will encounter this difficulty with the research reported in this study: while a student may exchange hard work in a course for, say, interesting lectures on the part of the professor, the student can also reciprocate with the professor by not being negatively critical of the professor to his family and friends.

Homans has one final major proposition. It is that:

> _PROPOSITION V_: The more a man's disadvantage the rule of distributive justice fails of realization, the more likely he is to display the emotional behavior we call anger.[19]

Homans' last major proposition suffers in its wording. Reworded the proposition may be stated as: "The more the rule of distributive justice is violated, the more likely a man is to display the emotional behavior we call anger." In short, the individual builds up expectations as to how he will be treated based both on his past experience and on the investments that he is making in the exchange; if these expectations are not fulfilled then the individual feels frustrated, cheated. We could predict that if a student worked hard for a professor and then got a low grade from him, the student would be angered by his professor's behavior. More specifically, if the student knew that his peers in the class had done the same calibre of work but had gotten higher grades, then he would feel unjustly treated and might, therefore, seek to reciprocate with his professor: the student might stop going to the professor's classes or might decide not to waste his time doing any further work for the professor.[20]

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[19] Homans, _The Elementary Forms_, _op_. _cit_., p. 75.

We noted earlier that in any exchange system the compondents try to maximize their profits, and to reciprocate. However, the profits of one of the components are generally at the expense of another (in primary exchanges) so that there is a constant pressure for the components to reach some sort of profit equilibrium. But the same is probably true for adversive exchanges; each of the components reciprocates with adversive stimuli. We might propose that exchange systems through time tend to polarize at either the positive or negative end of exchange relations; that is, they become predominantly negative or positive. From this proposition we might predict, for example, that the more positively reinforcing the professor's behavior, the more a student will like the professor, the higher the rating the student will give the professor, the more work the student will do for the professor, and the less disruptive behavior the student will engage in in the professor's class. Further, and in line with Homans' third proposition (p. 40), we might propose that the more valued an exchange relation, the harder the individual will work to maintain the exchange.

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[20] For a more detailed discussion of distributive justice see J. Stacy Adams, "Inequality in Social Exchange," in L. Berkowitz, Advances in Experimental Social Psychology, New York: Academic Press, 1965, pp. 267-99.

We are now in a position to introduce our first core proposition. It is that,

> PROPOSITION VI: The more relevant exchange systems reward similar behaviors, the more likely these behaviors will be emitted.

By the term 'relevant exchange systems' we refer to those systems of exchange relevant to any one particular behavior.

In the present research these exchange systems are the student-professor, student-peers, student-course, and student-self. If all the exchange systems reward similar behaviors, then the frequency of these behaviors ought to increase. However, in cases where there are cross-pressures, where a behavior is rewarded in one exchange system but is a liability in another, we cannot so easily predict whether or not the behavior will increase in frequency. If predictions were to be made they would require knowledge both of the value of the reinforcement and knowledge of the subjective probability that various behaviors would be rewarded. We might also predict that for freshmen students, where presumably peer and career influences are not as pronounced as they would be for seniors, that freshmen would tend to allocate their efforts more according to the objective requirements of courses, their professor's expectations, and their own self-concept as to what courses they ought to excel in; further, we might expect that the higher the grade expectations of a student, and the higher his ambition to do well in a course, the more he will be influenced in his effort-allocations by the objective requirements of the course. Indeed, if it is true that there is a tendency toward equilibrium, and if it is possible to satisfactorily operationalize the concept of cross-pressures, then we would predict that students will allocate their efforts in such a way as to be proportional to the pressure to work stemming from each of their courses. Thus, in a hypothetical two-course example, if the cumulative pressure (from the various exchange systems in which the individual is involved) to work in the first course was 200 units, while the pressure in the second course was 400 units, we could then predict that the student would work twice as hard in the second course as in the first one.

Another proposition is that:

> PROPOSITION VII: The more immediate the exchange system for a given behavior, the more influence it will have upon the behavior of the individual.

By 'immediate' we are thinking of those exchanges in which the individual is most intimately and directly involved. Hence while a student may receive some pressure to work hard in a Chemistry course from an uncle in New Zealand, such an influence would in most cases not have the valence of say a close friend in the class who is pressing the individual to work hard. The exchange with the uncle is probably remote and ineffectual; the exchange with the peer is more likely to be immediate and influencial. Similarly, we might argue that in classes with large enrollments the professor exchanges are not as likely to be as important as they would be in seminar-type classes. Presumably in larger courses the influence of objective course requirements, and ego-exchanges would take on a more salient role in the effort-allocations of students. We would also predict that one's peers within a class will be more important in determining the amount of work a student will do in a course than peers outside of the class. Peers outside the class may, of course, have a profound influence on how much work the student does in *toto* but probably do not have that much influence in how the student allocates his energies among his various courses.

Our final proposition is that:

> PROPOSITION VIII: The greater the inequality, or indebtedness, produced by interaction, the greater the pressure to reciprocate.

The pressure to reciprocate exists within the perception of the ego. We argued that to reciprocate and to bring into equilibrium an exchange relation, two approaches can be taken by ego. First, he can engage in secondary exchanges where he then indirectly makes the exchange just, or equitable; on the other hand, he may also engage in primary exchanges with the other component in the exchange to bring about a sense of equilibrium. The eighth proposition suggests that the more the indebtedness, the greater the pressure to reciprocate. If a professor gives an entertaining lecture one day then this will provide some moderate, or slight, pressure to reciprocate with the professor; however if the professor were to call a student into his office and go over a term paper with the student in detail, then the indebtedness and the consequent pressure to reciprocate with the professor would be increased. Under these conditions we might predict that primary and secondary exchanges would be set off by the special treatment the student has received.

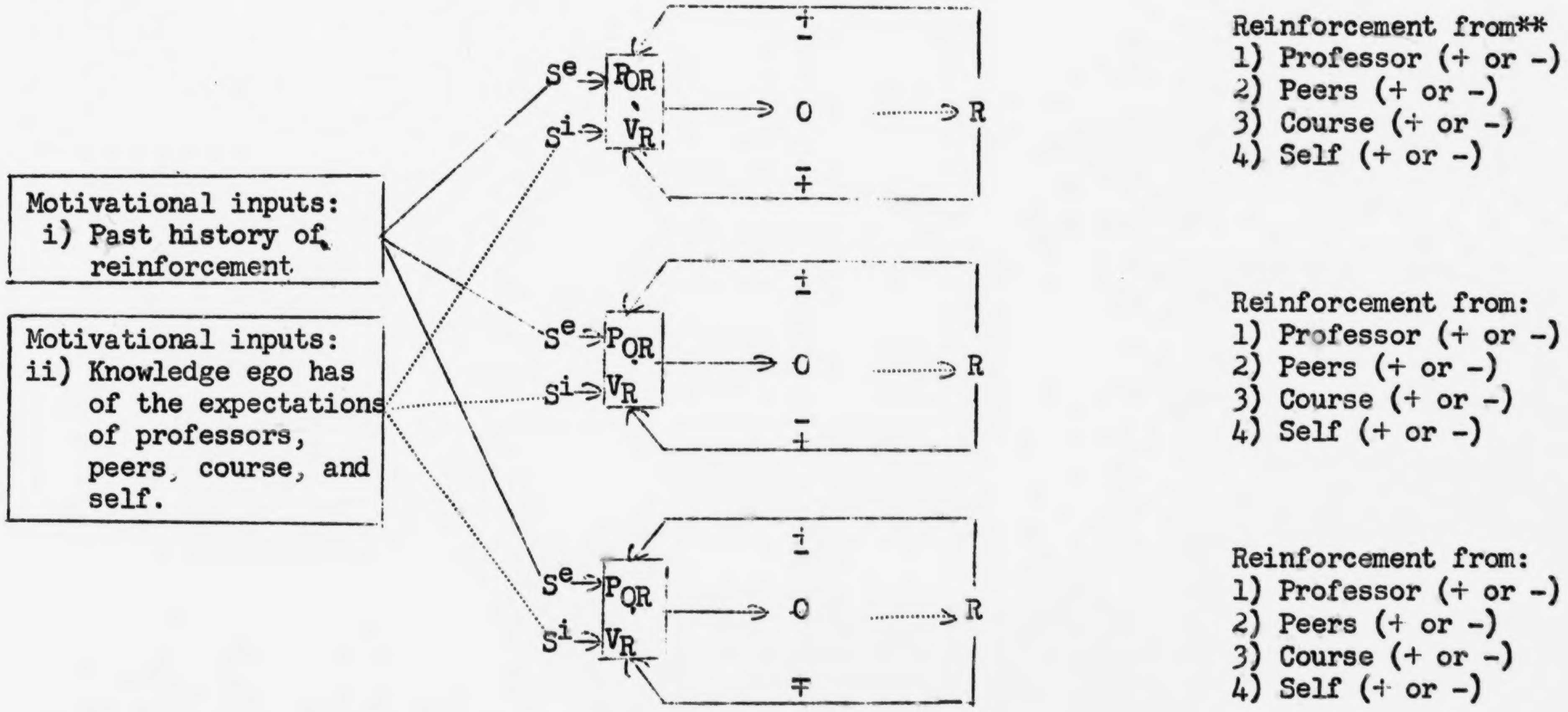
V. A MODEL OF HOW STUDENTS' ALLOCATE EFFORTS AMONG COURSES

Thus far we have outlined a general theory of exchange behavior, cited the particular problem with which we will deal, and finally we have presented a propositional statement which gives some indication as to the findings we expect from our research. Let us now turn our attention to a more specific model and outline the empirical requirements for its test.

As noted earlier, we are proposing that people attempt to maximize their profits in human exchanges and in exchanges with other components in the environment. Their behavior may not necessarily bring such profits nor do we maintain that man's actions are wholly (or even largely) rational and calculated. As a general rule, we have suggested that an individual's actions are based on (i) his past history of reinforcement for particular behaviors (the individual may or may not be particularly conscious of such reinforcement); and (ii) the individual's anticipations of his rewards and costs for following any course of action. An individual has certain predispositions toward certain behaviors because of his past history of emitting such behaviors and the consequences that such actions have had for him. Students, we predict, will distribute their efforts in the most profitable way to them. However, because of the various cross-pressures that play upon them, their effort-allocations may be an extremely complex process even though the principles of such allocations may be relatively straight-forward.

The model presented below (p. 51) indicates some of the complexities of our model. The motivation inputs (on the left of the model) represent Ego's past history of reinforcement (feeding into the exchange stimuli section and from there to the probability of reinforcement section) and his perceptions of the expectations of his professor, peers, course (objective requirements), and his self. In the first instance, the student allocates his energies so as to live up to the expectations of those people and components relevant

Figure 3. Exchange Model for the Allocation of Work Among Various Courses*


Motivational inputs:
i) Past history of reinforcement
Motivational inputs:
ii) Knowledge ego has of the expectations of professors, peers, course, and self.
S^e
S^i
P_{QR}
V_R
O
R
±
∓
Reinforcement from**
1) Professor (+ or -)
2) Peers (+ or -)
3) Course (+ or -)
4) Self (+ or -)
Reinforcement from:
1) Professor (+ or -)
2) Peers (+ or -)
3) Course (+ or -)
4) Self (+ or -)
Reinforcement from:
1) Professor (+ or -)
2) Peers (+ or -)
3) Course (+ or -)
4) Self (+ or -)

*Symbols have the same meaning as those presented in the general model (Figure 2). Each of the exchange systems represent one course in which the actor is involved. Thus the pressures and cross-pressures from three courses are shown in the figure.

** Reinforcement may be positive (+) or negative (-) from professor, ppers, course, or self.

to work behavior; we would also argue that he will distribute his energies so as to maximize profits. But distributing his efforts in any particular way will have consequences for the individual. These consequences then feed-back to the value of reinforcement and the probability of receiving reinforcement sections of the model. Reinforcement will temporarily decrease the value of reward while increasing the subjective probability that future actions will bring reward.

In each course, a student is presented with certain stimuli which are either rewarding, punishing, or of neutral value to him. In our particular case, we are interested in the amount of work a student puts into each of his courses; the student exchanges a certain amount of work for various rewards from his professors, peers, courses, and his own self-concept. If he is unable to develop a positive exchange with his professor then some attempt will most likely be made to balance off the losses of this unprofitable encounter (or, at least, attempt to ensure that future losses will not occur); the student may balance off his losses by coming to dislike the professor--exchanging, as it were, feelings of antipathy for the aversive stimuli of the professor. While this does not make equal his exchange with the professor (the professor does not know of the student's feelings), it does permit the student to balance off his losses in the exchange. Alternately, the student may make the exchange direct (and aversive) by engaging in disruptive classroom behavior, or by failing to show proper deference to the professor.

The model presented has some challenging possibilities. But it has difficulties too: There is the problem of determining what attributes of professors, peers, courses, and self-dimensions are valued and will promote discriminant working behavior on the part of students. Since we assume that through time profit structures (of the components in the exchange) will achieve some semblance of equilibrium, we can anticipate that the amount of work done in any one particular course will be a function both of the competing rewards offered by other courses and the within system rewards offered by any one course.[21]

VI. VARIABLES IN THE FOUR EXCHANGE SYSTEMS

Let us now cast our attention toward the four exchange systems that we have postulated to be relevant to the determination of effort allocation among students. In each case, we will simply list and then briefly discuss the rewards that might be exchanged by the various components in the exchange system.

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[21] We will not discuss how these concepts will be operationalized at this point. That discussion will be reserved for the next chapter.

Student-Professor Exchanges. A professor can potentially offer the following rewards to his students,[22] each of which may or may not be valued by the students:

1) Fairness in treatment of students;
2) presenting the students with stimulating ideas;
3) giving the students individual attention;
4) being friendly with the students;
5) playing the role of professor well;
6) presenting enthusiastic, entertaining lectures;
7) providing assistance and information helpful to the student in achieving his career goals;
8) presenting lectures relevant to the examination and papers given in the course;
9) praising the student for good work in the course;
10) making himself available to the students in terms of personal contact;
11) liking the students;
12) being reasonable in terms of giving good grades.

The above characteristics are those which we thought might be relevant to how hard students would work in their various courses as well as setting the stage for other kinds of reciprocities on the part of the student. It is to be noted that while we initially thought that all of these variables would have a positive valence, such would not, of course, have to be the case. Indeed, it is quite possible that a student might find public praise extremely costly when it comes to relations with their peers whose norms might be such that such praise would mean that the student was working too hard. We should also point out here that what is important in terms of the students' reciprocations are their perceptions of the professor attributes, not their 'real' magnitude.

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[22] The variables discussed here were arrived at both by a process of intuition and through classroom discussions with students and talks with students who participated in a pilot study made on the subject of this research. See J. E. Winston Jackson, "What Makes Johnny Work," unpublished paper, Department of Sociology and Anthropology, Washington University, St. Louis, Mo., 1966.

In our formulation, we have assumed that equilibrating processes will be in operation. Thus a student will try to reciprocate with his professors--try, as it were, to reciprocate kindness for kindness and unkindness for unkindness. Such exchanges may go on at either the primary or the secondary levels. The following list of variables were thought of as constituting the various kinds of exchange behaviors or sentiments that would be relevant to the students' relations with their professors:

1) Liking the professor;
2) participating in class discussions;
3) not being critical to friends and family of the professor;

4) showing deference to the professor;
5) attending lectures regularly;
6) working hard for the professor;
7) by not engaging in disruptive classroom behavior.

Although our primary interest is in determining the variables that account for variations in the amount of work a student devotes to each of his courses, we should, nonetheless, be able to account for variations in the student variables listed above by the professor variables (p. 53) when we hold constant the effects of other variables. We would not, however, expect to be able to account for the professor's behaviors since he is simultaneously involved in exchanges with many students and with other systems of exchanges not included in our analysis. To the extent that students value the same sorts of behaviors, we should be able to account for the variations in student efforts when we hold outside influences constant. Later we will discuss how we will examine statistically the relationship between student variables and professor characteristics. The technique used will be that of canonical correlations. It is important to keep in mind that we are getting at both sides of the exchange--namely, the student's perspective. What is important here is that if a student perceives an exchange is taking place, whether the professor 'actually' reciprocates is irrelevant.

Student-Course Exchanges. We now will consider a case of non-human exchanges, the reciprocation between course and student. A course can provide the following to the students:

1) Provide a certain amount of information;
2) provide information relevant to the student's professional preparation;
3) place certain work demands on the student;[23]
4) have a certain level of difficulty;
5) possess subject matter that is of intrinsic interest to the student;
6) possess attributes that live up to the student's expectations of the course.

For his part, the student may reciprocate with the course by engaging in the following behaviors or having certain sentiments toward the course:

1) Liking the course;
2) rating the course highly;
3) not being critical of the course to family and friends;
4) working hard in the course.

Once again, if there is a tendency toward equilibrium in exchanges then we should be able to predict the student's exchange with the course (the dependent variables) from the course characteristics variables (independent variables).

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[23] As noted earlier, the work demands of a course may also be viewed as contingency of the exchange with the professor; unless the student fulfills the requirements of the course he may have to forgo the rewards the professor has to offer.

Student-Peer Exchanges. In our research we will limit the influence of peers to the in-class ones. Peers in the class, for instance, may have certain expectations as to the 'proper' amount of work that should be done in a course. Presumably, to the extent that a student lives up to the informal norms of his peers he will earn their approval. While it is possible that out-of-class peers might have some influence on total work done, we have assumed that they will have influence on the allocation of efforts among various courses; we have decided--as we did for the influence of the student's family--that the [illegible] of out-of-class peers would be slight and perhaps non-existent. The peer characteristics that we will measure will be as follows:

1) The amount of work a student's class peers expect him to do;
2) how well class peers expect a student to do;
3) the amount of approval the student thinks he would get from his class peers if he got a good grade.

The reciprocity here would consist simply of living up to (or not living up to) the expectations of one's peers and would consist of:

1) The amount of work done in the course.

Ego-Exchanges. Ego-Exchanges also are relevant to the problem set by our research. A student engages in exchanges with himself: he may have a certain self-concept, a certain anticipation as to how well he ought to do in each of his courses. This self-concept may be independent of peer, course and professorial expectations. Thus, if a student sees himself as one of the 'first-rate' students in a class then this perception will (or may) provide motivation to work so as to fulfill this perception. The following variables might be relevant here:

1) The student's notion as to how much work he ought to do in each of his courses;
2) his conception of how well he should do in the course;
3) his conception of how well he will do in the course compared to other members of the class;
4) his ambition to do well in the course.

The reciprocation takes the following form:

1) The amount of work done in the course.

One of the difficulties in the ego-exchange, is that ambition may well be a function of the pressures stemming from exchanges in other courses. In fact, ambition may be a function of the pressure coming from other exchange systems and where ambition is the mediating link between the experiences in these systems and may be providing the motivational inputs into those systems.

As a final note to this chapter it would be well to point out what this research is not concerned with: we are not interested in the problem of academic performance per se; nor are not interested in the total amount of time a student devotes to his studies, nor are we interested in predicting how well students will do in any or all of their courses. What we are interested in is the variables that control student allocations of time spent on school work. We are interested in this problem both as a problem of prediction as well as a problem in understanding the synamics of such a process.

Our main effort in the chapters to follow will be in (1) locating the variables that control effort allocations among college freshman and senior students and (2) analyzing the various proposed exchange systems.

CHAPTER III

Methodological Considerations

I. INTRODUCTION

In this chapter we will discuss how variables have been operationalized and discuss some of the difficult issues (both theoretic and practical) that we have faced in conducting the research. It is to be noted that the theoretical model outlined in the previous chapter is not, and could not be, fully tested in this research. We have not been able to operationalize all of its many components; hopefully, though, further research will elaborate on the theory presented and provide further empirical tests of its propositions. Let us begin by discussing some of the theoretical issues that we have faced.

Perhaps the most pressing problem in contemporary social science is that of developing adequate means of testing theoretical ideas. On the one hand, there is the problem of making epistemic jumps from the theoretical to the operational level and, on the other, there is the problem of adequately demonstrating the nature of the relation between the operational variables. But there is even a more pressing issue: once we have operationalized our conceptual variables and carefully analyzed the relationships, we have not yet cracked the scientific problem. This problem is that of meaningfulness. While there certainly would not be agreement within the scientific community that we must ask why questions of our data, we generally do ask these questions. Thus, while we may demonstrate (as many have done) that there is a direct relation between social class and educational aspirations, merely to know this as an empirical fact, does not adequately explain it. Adequacy of explanation raises many issues: it deals minimally with empirical, intuitive, and psychological questions. Through intuition we may be able to make speculations about the connecting links between variables and then we may be able to perform empirical studies to determine whether or not our explanation holds up under further investigation. Then after all the research has been completed the psychological question of whether or not we have satisfactorily solved the problem of the research may be asked. Indeed, this may well be the essence of the scientific precedure: once we have established empirical relations of a uniform nature we then go on and further refine our techniques to make more sophisticated tests of our propositions. It would probably be fair to say that the social scientists have been particularly negligent in their research. They stop too soon. Having demonstrated an empirical relation they frequently stop the research and go on to a new problem, leaving the explanation at the intuitive level rather than going on and further testing the adequacy of this explanation.

Determinism and Causal Analysis. One of the difficulties presented by the research reported here is that we will attempt to arrive at causal statements about the relations between variables. And what is particularly difficult about this is that we are dealing with non-experimental data. In experimental studies the experimentor can manipulate, one at a time, the independent variables, and measure the effects of such manipulations on his dependent variable(s): Here the causal inferences are reasonably direct even though if all outside influences are controlled there is the danger, when extrapolating one's findings to the 'real' world, of over emphasizing the importance of the experimental variables. For a variable that controls 5 to 10 per cent of the variation in the dependent variable in the 'real' world should control all the variance in the contrived experiment where control over outside influences has been perfectly achieved. Nevertheless, such research can be invaluable in determining the nature of the relation between variables, even though such relationships may only hold in very special circumstances.

One of the assumptions that underpins most scientific inquiry is that all natural phenomena are determined, whether physically, biologically, psychologically, or sociologically. I say most scientific research because, as of late, some have argued that stochastic processes characterize many phenomena, and particularly those in the social realm.[1] But this is probably an impractical assumption. As a working model, I would opt for the point of view that would argue that all relations are determined and that through the use of appropriate techniques we can discover the causes of variability of phenomena. This position is taken for practical reasons. For if one works with the notion of stochastic processes, there is no way of telling when the empirical side of the research process is completed; with the notion of determinism, however, only when one has been able to account for most of the variance in the dependent variable, only when one can replicate one's results, and only when we have arrived at meaningful explanation of these results, can the research job be considered complete. This orientation may seem to be setting unrealistically high standards for the social scientist. But these goals may be taken precisely as that--as goals--and we ought to attempt to approximate them in our reserach endeavors.

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[1] Both Zetterberg and Blalock would seem to accept the notion that stochastic processes characterize sociological variables. Perhaps what happens when someone finds a stochastic process is that he simply has failed to employ all the variables that are causing the variations, or has improperly analyzed the relationships.

The Role of Theory. First and foremost, theory must be stressed in arriving at causal explanations of phenomena. Here the term theory is used in the sense of interconnected propositions stating the nature of the relation between conceptual variables. I will argue that it is theory which explains relationships--not statistical tests of any type--and that it is only when we have a theory of a phenomenon can we hope to speak of either explanation or causation.[2] True, statistical tests may help the researcher delineate appropriate variables, help him assess the relative importance of each, indeed they may provide the basis for new theoretical insights, and help him evaluate the adequacy of his theory, but it is only theory that connects one's operationalizations to the realm of meaning and explanation. It is only through theory that why questions can be answered. Furthermore, theory provides one method for establishing the time sequence in a causal nexus. In short, statistics without theory are only so many numbers. Put in their proper perspective, statistical techniques are to be regarded simply as heuristic devices.

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[2] For the notion of theory expressed here, see George C. Homans, "Bringing Men Back In," American Sociological Review, Vol. 29 (1964), pp. 809-18. Many would question whether the concept of cause is worthwhile in the social sciences. I would argue that to the extent that it can be logically or empirically demonstrated that a cause is prior to an effect,

While ultimately theory--and only theory--can explain phenomena, we must go through various steps in the verification of theoretical relationships. How, then, do we verify or refute theories of phenomena? This is an area in which the problems range from basic research design questions to philosophical ones. Generally, science proceeds by a process of elimination. Having developed a theory of a phenomenon, we then seek to discover under what conditions the theory holds up and under what conditions it is insufficient. In short,

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and to the extent that we can account for variations in the effect by analyzing the causal variables related to it, is it meaningful to speak of causation.

we seek to disprove--or at least modify--each theory in our research. If, however, after a number of attempts to disprove a theory, we are satisfied that we have adequately specified the conditions under which the relationships between the conceptual variables hold, we then claim that we have an explanation of the phenomenon. Any theory is, of course, subject to modification--or complete rejection--if subsequent research demonstrates that it is in error. A consequence of this perspective would seem to be that there is no such thing as a law--a theoretical invariance--in science. All theories are subject to modification, none can ever achieve the status of law. (This does not deny that we may, for practical purposes, treat some theories as laws; if we did not, advancement in science would be hopelessly thwarted.) The thorny issue, however, is that of induction. How often do we have to demonstrate that a theory 'holds up' before we feel safe in making further deductive propositions from it? Generally we resolve the problem of induction by assessing the relative costs of making errors. If the costs of an error are not too great, then we would be satisfied with reasonable certainty. Stated in statistical terms, the researcher analyzes the costs of making Type I errors as over against Type II errors (accepting the Null Hypothesis when it should be rejected). While we can never achieve absolute certainty in science, we can specify the kind of certainty that we insist upon in our research.

The Role of Measurement. Robert McGinnis, in his well-known critique of Selvin's paper on tests of significance, suggests that if we are ever going to be able to make causal inferences in social research we will need more precise measurement.[3] In a similar vein Blalock has argued that:

> A graduate student in sociology could hardly be given better advice than to become a measurement specialist. Clearly, the gap between theory and research cannot be closed until measurement has been improved.[4]

The point is well taken. For many of the statistical techniques used to make causal inferences require measurement at the interval level.[5] The cost of violating the measurement assumptions must be paid in terms of lower explained variances, decreasing the likelihood that the research could be replicated, and possibly leading to an inability to even correctly identify the causal variables.

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[3] Robert McGinnis, "Randomization and Inference in Sociological Research," American Sociological Review," 1958, p. 414.

[4] H. M. Blalock, "A Causal Approach to Measurement Theory," Et. Al., Vol. 1, No. 1 (1967) p. 6.

[5] For a good review of the various scales of measurement see S. S. Stevens, "Measurement, Psychophysics, and Utility," in C. W. Churchman and P. Ratoosh (Eds.), Measurement: Definitions and Theories, New York: Wiley, 1959, pp. 18-63.

The Role of Explained Variance. To the extent that it has been possible to order the causal variables in their correct order (we assume an underlying truth), and to the extent that we have accounted for the variations in the dependent variables, can we legitimately speak of causation. When a significant proportion of the variance remains unexplained, we may conclude that either we have failed to include all the relevant variables, or we have used an incorrect theory, or that we have failed to measure our variables with sufficient precision. If we maintain that a theory is to be judged by its meaningfulness and by the extent to which it accounts for the phenomenon it is attempting to account for, then the criterion of explained variance becomes a useful tool in assessing the adequacy of the theory.

II. AN INTRODUCTION TO THE MEASUREMENT TECHNIQUE

Keeping in mind the preceding discussion, let us now turn our attention to the measurement technique that was used in this research. Given the fact that our interest was in determining the relative amount of effort students put into their various courses, we could not easily rely on some objective measure. To look at grade reports (if they may be considered objective, for the sake of arguement), would prove meaningless since in some courses students probably have to work much harder for their grades then they do in other courses. Similarly, to ask a professor how hard each of his students were working would make little sense even if the professor only had 30 students, let alone 300.

As the planning for the research went on, it became apparent that we would have to rely on the students' perceptions of how hard they were working in each of their courses. The real advantage of using students' perceptions of the magnitude of the various variables was that it seemed quite clear that what one student might perceive to be a good attribute of a professor, for example, might turn out to be a disagreeable quality to another student. But there is another advantage as well: the behavior of students in exchange relations most probably is based upon their perceptions of the relevant phenomena.

Having successfully used the techique of magnitude estimation in other research projects, this technique seemed to offer the best possibilities for measuring the variables that were of interest to us. This technique and other related subjective ratio measurement procedures were largely developed by S. S. Stevens, a psychophysicist at Harvard University.[5] Very briefly the technique involves having the subject provide an estimate of the magnitude of some stimuli compared to some standard which has been set for him, or which he sets for himself. Numerical estimates or any of a variety of cross-modality matching techniques are possible. To illustrate the technique, the following numerical example will be used:

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[5] Through the use of these techniques, Stevens has discovered that lawful relations exist between physical stimuli and the perception of these stimuli. In all cases, a power function best describes the relation between the magnitude of physicial stimuli (measured physically) and the perception of the magnitude of the stimuli (measured with various types of magnitude estimation). The exponents vary from stimulus to stimulus. Stevens has also reported that similar relationships also hold for metathetic continua (those for which there is no physically measurable dimension) in S. S. Stevens, "A Metric for the Social Consensus," Science, Vol. 151 (1966), pp. 530-41. Robert L. Hamblin appears to be the person responsible for bringing this measurement technique to the attention of sociologists. See, for example: Robert L. Hamblin, "Ratio Measurement and Sociological Theory: A Critical Analysis," paper read to the American Sociological Association's annual meetings, Miami, August, 1966; Robert L. Hamblin and Carole H. Smith, "Values, Status, and Professors," Sociometry, Vol. 29 (1966), pp. 183-96; Robert L. Hamblin, "Values, Status, Influence, Salary, and Physics Professors," Washington: U. S. Department of Health, Education, and Welfare, Office of Education, Bureau of Research, December, 1966.

If this line (___________________) is 100 units
long, how long would you estimate the following
lines to be?

(a) __
(b) ____
(c) _____
(d) ___________________

In each case, the subject would be asked to provide a number which would show the proportionality between the first line (given an arbitrary value of 100) and each of the other lines. If the subject thought that the line was 1/5 of the standard, then he would respond by saying 20; if thought it was twice as long he would say 200 and so forth. It is to be noted that the standard need not necessarily be set at 100; in fact the subject may set his own standard if he so desires. The main point is, however, to get the subject to give a response which will reflect the proportionality between the magnitude of the standard and that of the various items to be measured.

In our research we presented such questions as:

How difficult is your __(Biology)__ course
(compared to your other courses equalling 100?)

Since the difficulty of a course lies in the eyes of the beholder, and since we wanted to get a measure that would compare each of the student's courses to his other ones, (and hence simultaneously operationalize our concept of cross-pressures), the technique of magnitude estimation was ideally suited to our needs. Furthermore, this technique provides measurement that comes closer than any other to giving measurement at the ratio level which means that relatively sophisticated statistical techniques may be used in data analysis without violating the measurement assumptions of these statistics.

A further advantage of the magnitude estimation technique is that it provides a direct, uncomplicated measure of the variables. The merit of direct measurement is that it minimizes the number of epistemic steps. We are confident that the most efficacious way to find out how hard a student works in a course is to ask him. While some researchers might argue that more than one index should be used (and subsequently weighted) to measure a variable, the response to such criticism would be that any advantages that might accrue probably would quickly diminish due to the increased measurement error that would result from more elaborate procedures. Our approach to measurement is simple and direct.

One further point needs to be developed in connection with the measurement procedure employed. Essentially what we are doing is allowing each student to set as a standard his average course or average professor for the various attributes measured. Thus, for example, a student would provide estimates indicating how interesting one professor's lectures are compared to the other professors' lectures from whom he is currently taking courses. Each set of estimates is therefore standardized to the individual. Effort-allocations, according to our theory, will be based on the unique structure of cross-pressures stemming from the particular combination of professor, course, peer, and individual attributes. Some of these attributes pressuring the student to work harder in a course, some detracting from hard work; in addition, there will be greater total pressures to work in one course compared to another and we expect that effort-allocations will, in fact, be proportional to the total cross-pressures operating on each course.

As in psychophysical research, we are measuring each subject over a range (which, however, may be limited in some cases) of the continua presented. Thus, when we ask how 'entertaining' each of the students' professor's lectures are, we have part of a continum of entertainment level of lectures. Each subject acts as his own control. The implication of this type of control is that many outside influences are ruled out. Suppose, for example, that we have two students--one who habitually gets 'A' grades and another who consistently produces 'C's'--and suppose, further, that the A student puts in 25 hours a week studying while the C student puts in 10 hours. The question we are asking is not who puts in the most hours but rather what variables predict how these two students differentially allocate what time they do spend.[6]

III. THE COHORT STUDIED

The cohort in this study consisted of 60 freshmen and 60 senior students enrolled in the Liberal Arts program at Washington University. In addition, the cohort was evenly divided between males and females. The freshmen students were contacted by the researcher going into various discussion sections and asking for volunteers. Since they were to be paid for their participation, cooperation was readily obtained. Some of the subjects also come from the researcher soliciting participants in the university's library. The senior students were a little more difficult to contact since there was no one place where they could be contacted en mass. Eventually an assistant was hired, who was herself a junior but knew many of the seniors, and she soon had the appointment book filled.

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[6] For utilization of similar method of control see Robert L. Hamblin, "Ratio Measurement," op. cit.; Hamblin and Smith, op. cit.; and Hamblin, "Values, Status, Influence, Salary, and Physics Professors," op. cit.

The first interview was carried out on March 22, 1967 and the final one was obtained April 24, 1967. The nature of the subject was such that it was necessary to wait until the students had had a fair amount of experience in each of their courses, and yet not be too close to the final examination period. Since the data was collected during the Spring Semester, a good number of the seniors were in their final semester, while virtually all of the freshmen had at least one semester of study behind them.

Generally it took between 40 and 60 minutes to run a subject through the questions. In all cases the subjects provided estimates of all the variables for each of the 3-unit courses in which they were enrolled in the Spring Semester of 1967. In all, estimates for some 549 courses were obtained (See Table 1, p.77). The freshmen provided 280 of these estimates while the seniors provided the remaining 269.

The subjects were trained in making magnitude estimations by having them make numerical estimates of line lengths. (See Appendix B, p.), for a copy of the training material em-

Table 1. Number of Courses Evaluated

COHORT	Number of Courses (a)	Frequency (b)	Total Courses Evaluated (a x b)
FRESHMEN	4 courses	20	80
	5 courses	40	200
	(A) TOTAL FRESHMEN COURSES		280
SENIORS	3 courses	5	15
	4 courses	26	104
	5 courses	24	120
	6 courses	5	15
	(B) TOTAL SENIOR COURSES		269
	(A + B) TOTAL COURSES EVALUATED		549

ployed.) After they had provided these estimates, they were plotted, and a least-squares line was drawn between the points. The plotting was done so as to give the subjects confidence in their ability to make numerical estimates. Such confidence was forthcoming when, with few exceptions, the least-squares line came close to intersecting all the points which they had estimated.

After the researcher had satisfied himself that the subjects could make the estimations, the questions were started. Each of the questions was typed on a 3 x 5" card and these were shuffled before each subject began to give his estimates. This procedure was followed to ensure that order-of-presentation effects would be controlled. The researcher would then ask the subject to name the courses and the professors involved in each of the courses in which he was presently enrolled. This information was written at the top of a data sheet for each of the courses (see Appendix A, p. . The data sheets were set up to facilitate key-punching of the information.) Estimates for each variable were then collected. The questions asked are listed in Table 2.

Table 2. Variables Measured by the Magnitude Estimation Technique

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1. How fairly would you say that you are being treated by Professor _____ (compared to your other professors equalling 100)?

2. How easy would you say it is to get a good grade from Professor _____ (compared to your other professors equalling 100)?

3. How good would you say Professor _____'s ideas are (compared to your other professors equalling 100)?

4. How much individual attention do you get from Professor _____ (compared to your other professors equalling 100)?

5. To what extent do you feel Professor _____ is preparing you for your future career (compared to your other professors equalling 100)?

6. To what extent would you say Professor _____ meets with your expectations of what a professor should be like (compared to your other professors equalling 100)?

7. How entertaining would you say Professor _____'s lectures are (compared to your other professors equalling 100)?

8. How relevant would you say Professor _____'s lectures are for the tests, examinations, and papers given in the course (compared to your other professors equalling 100)?

9. How much personal praise would you say you have received from Professor _____ for good work (compared to the amount received from your other professors equalling 100)?

10. How much personal contact have you had with Professor ____ (compared to your other professors equalling 100)?

11. How much do you think Professor _____ likes you (compared to your other professors equalling 100)?

12. How satisfied have you been with the grades you've been getting on essays and exams in Professor _____'s class

Table 2. (Continued)

(compared to your satisfaction with your other courses equalling 100)?

13. Before entering your _____ course, how good did you expect Professor _____ would be (compared to your expectations of your other professors equalling 100)?

14. How much would you like to earn the approval of Professor _____ (compared to your other professors equalling 100)?

15. How much work is required in your _____ course (compared to your other courses equalling 100)?

16. How much would you say you've learned in your _____ course (compared to your other courses equalling 100)?

17. To what extent would you say your _____ course is preparing you for your future career (compared to your average course equalling 100)?

18. How difficult would you say your _____ course is (compared to your other courses equalling 100)?

19. How interesting is the subject matter of your _____ course is (compared to your average course equalling 100)?

20. Before starting your _____ course, how good did you expect the course would be (compared to your other courses equalling 100)?

21. How much work do you think your friends in your _____ course expect you to do (compared to your friends in your other courses equalling 100)?

22. How well do you think your friends in your _____ course expect you to do (compared to your friends in your other courses equalling 100)?

23. How much work do you think you should do in your _____ course (compared to your other courses equalling 100)?

24. How well do you think you will do in your _____ course (compared to how well you think you will do in your other

Table 2. (Continued)

courses equalling 100)?

25. How well do you think you will do in your _____ course (compared to how well the average student in the course will do equalling 100)?

26. How ambitious are you to get a good grade in your _____ course (compared to your other courses equalling 100)?

27. How much do you like Professor _____ (compared to your other professors equalling 100)?

28. How much do you participate in class discussion in Professor _____'s class (compared to your other classes equalling 100)?

29. How well do you think Professor _____ plays the role of professor (compared to your other professors equalling 100)?

30. How negatively critical have you been to your family and friends of Professor _____ (compared to your other professors equalling 100)?

31. How much respect do you think you show Professor _____ (compared to your average professor equalling 100)?

32. How frequently do you attend Professor _____'s lectures (compared to your other professors lectures equalling 100)?

33. How much work do you do in your _____ course (compared to your other courses equalling 100)?

34. How hard do you try to impress Professor _____ (compared to your other professors equalling 100)?

35. How much do you engage in disruptive behavior in Professor _____'s class (compared to your other classes equalling 100)?

Table 2. (Continued)

36. How much would you like to earn the approval of your friends in your _____ course (compared to your other courses equalling 100)?

37. How much approval do you think you would get from your friends in your _____ course if you got a good grade (compared to your other classes equalling 100)?

38. How pleased would you be if you got a good grade in your _____ course (compared to your other courses equalling 100)?

39. How much do you like your _____ course (compared to your other courses equalling 100)?

40. How highly would you rate your _____ course as a university course (compared to your other courses equalling 100)?

41. How negatively critical have you been to your family and friends of your _____ course (compared to your other courses equalling 100)?

42. How friendly would you say Professor _____ is (compared to your other professors equalling 100)?

43. How much competition is there for good grades in your _____ course (compared to your other courses equalling 100)?

After a response to the first question had been obtained, the researcher would then ask about each of the other courses in a similar manner. Once the subject got familiar with the estimation procedure, however, it was not necessary to repeat the question totally for each course. In fact some subjects soon remembered the order in which the researcher asked about the courses, and could give the estimates rapidly. Occasionally a subject would ask for more specific instructions on a question and this would be provided by the researcher. Generally, the questions had what might be described as an 'intuitively obvious' ring about them, so that most subjects were able to respond rapidly. In order to provide some check on the reliability of the measurement technique, the last question in the series always was a repeat of the main dependent variable in the study: "How much work do you do in your _____ course (compared to your other courses equalling 100)?" Here it was found that the correlation between the first and second responses to this question varied from .81 to .93 (as indicated in Table 3, p.84). It might be noted in connection with the reliability check that it was observed that the subjects frequently maintained the same proportion between the various courses, but may have shifted to a slightly different scale. Thus the first time they might have given estimates

Table 3. Measurement Reliability*

COHORT/SEX	MALES	FEMALES
FRESHMEN	.927	.814
SENIORS	.920	.857

*The measurement reliability represents the product-moment correlation between the first response to the question concerning how hard student's work in their various courses and the responses made to the same question when posed later.

(in the three course case) of 50, 75, and 150, and when asked the same question later would say 75, 125, and 250. Note that the proportions have remained almost the same, only the scale has varied. Since we want the best measurement possible of our main dependent variable we took the average of the estimates on that variable. Ideally, of course, it would have been better to ask all the questions two or even three times, but since it took some 40 to 50 minutes to run a subject through, such an option was not realistically possible. It might also be noted that invariably when asked to give the second estimate on how hard the student worked in each of his courses, the subjects rank-ordered their estimates, usually kept the proportionality, and frequently gave the identical responses the second time through. Since the students were giving estimates for all their courses on some 40 odd variables, (over 200 estimates for students enrolled in 5 courses) there was little chance of their remembering the estimates that they had given previously. In fact, not many asked: "Say, haven't we done that one already?" If caught in this act of deception, the researcher simply admitted his guilt and asked them to give the estimate anyway, and told them not to worry about being consistent with their first response.

Occasionally throughout the administration of the questions, the researcher would stop the subject and repeat his estimate (say, it was 160) and say, "You mean you like your French course a little more than one and a half times as much as your other courses?" This procedure was followed so as to make certain that the subjects were still thinking in terms of proportions, and not simply giving rank-ordered numbers to reflect the magnitude they wished to express.

Information on the sex of the subject, the size of each of the courses, the number of lab assignments, tests, and essays for each course was also recorded. Finally, we asked the subjects to specify the minimum grade they would be satisfied with in each of their courses. After the information was collected it was key-punched and made ready for computer analysis.

IV. METHOD OF ANALYSIS

This section will deal with the specific techniques used in the analysis of the data (canonical correlations and multiple regression) and with some of the problems that we encounterd in their use. But before we introduce these two techniques to the reader, let us discuss the problem of measurement error and the procedures that were followed in attempts to minimize it.

Ideally it would have been preferable had we been able to have each student provide us with a number of sets of estimates for all of the variables. Had time (and the tollerance of students) made this possible, we would have then been in a position to take the average estimate for each variable and in this way get more exact estimates. However since it was not possible to follow such a procedure, all we did was have the subjects provide two estimates of the main dependent variable and then we took the average of these two estimates. As noted earlier the reliability coefficient (the correlation between the first and second observations) was circa .88.[7] Because we could not take advantage of much averaging, the total amount of variance accounted for in the research will probably not be as high as in those studies where greater use of averaging was possible.[8] Nonetheless it is to be noted that magnitude estimation provides measurement that is perhaps the most sensitive measurement procedure available to researchers interested in attitudinal and perceptual phenomena.

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[7] In psychophysical research the reliability coefficient usually is about .95. Apparently, the estimation of subjective phenomena is not as precise as it is for physical phenomena.

[8] For a review of literature using averaging of magnitude estimation data see Robert L. Hamblin, "Ratio Measurement." _op_. _cit_.; Robert L. Hamblin and Carole R. Smith, "Values, Status, and Professors," _Sociometry_, 29 (1966), pp. 183-196; Robert L. Hamblin, "Values, Status, Influence, Salary, and

The substantive problem of this research is to locate the variables that account for variations in the amount of effort students put into their various courses. The theoretical issue is whether or not the theory outlined is adequate for an explanation of the results. The criterion of explained variance is an index of whether or not we have been able to satisfactorily account for our data using the theoretical model proposed. To the extent that we have been able to account for variations in our dependent variable, we may argue that we have accounted for the phenomenon under investigation. The model of analysis will be that of linear multiple regression with a procedure built into the analysis so that only significant variables remain in the prediction equation. But our interests are also in examining the exchange relationships between professor and student, between

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Physics Professors," Washington: U. S. Department of Health, Education, and Welfare, Office of Education, Bureau of Research, December, 1966.

course and student, between peers and students and, finally, those involving the internal exchanges within the individual himself. Since there are a number of attributes that may be exchanged, and since all of these must be simultaneously taken into account, we have decided to apply the technique of canonical correlations to our data as well. But before we introduce these two statistical techniques, one further comment regarding the nature of the data is in order.

Typically in using magnitude estimation techniques it is found that the measurement error is distributed log-normally. That is, as one moves up the continuum being measured, error increases as a log function of magnitude; we will make log transformations of the data so as to meet this assumption. In doing so, the linear regression model is transformed so that the relation between the variables is multiplicative.[9]

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[9] For a good discussion of _error_ in investigations using magnitude estimation techniques see S. S. Stevens, "A Metric for the Social Consensus," _Science_, Vol. 151 (1966) pp. 530-41. In the two-variable case, psychophysical research has clearly indicated that "equal stimulus ratios produce equal perceptual ratios (and) the perceived magnitude ψ grows as the physical value φ raised to the power β." Hence,

$$\psi = k\varphi^{\beta}$$

Cf. Stevens, _Ibid_. Hamblin, "Ratio Measurement," _op_. _cit_. has suggested that the multivariate power function also characterizes the relation between variables of a social and psychological nature.

An Introduction to Multiple Regression. Multiple regression is in the least-squares family of statistical techniques. Using this technique, we attempt to predict a dependent variable from two or more independent weighted variables. While in partial correlation techniques we attempt to measure the correlation between two variables while simultaneously adjusting for the influence of other variables, in multiple regression we attempt to discover the actual equation that describes the relation between the independent variables and the dependent one.[10]

Most commonly in multiple regression, an assumption is made that the relation between the variables is linear (i.e., additive); however, by making various transformations other types of relationships can be examined. As in factor analysis and in partial correlational techniques, measurement is assumed to be at the interval level (the same as ratio level measurement except that the zero point is unknown). A further assumption made in the use of multiple regression is that the error of the variables is normal (homoscedasticity).

The multiple regression model is to be seen as a predictive model and one in which the regression equation is based upon a least squares fit to the means of the dependent variable for all combinations of the independent variables. For every combination of X's there will be a distribution of Y's. The form of the linear multiple regression equation is as follows:

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[10] For a good introduction to multiple regression analysis see Hubert M. Blalock, Social Statistics, New York: McGraw-Hill, 1960, pp. 351-357.

$$Y = \underline{a} + \underline{b}_1X_1 + \underline{b}_2X_2 + \ldots + \underline{b}_kX_k$$

In the question the _a_ is a constant; it is referred to as the regression constant. In the two variable cases, it refers to the point at which the regression line intersects the Y axis. The _b_'s, on the other hand, refer to the slope of the regression line. Very simply, the strategy of multiple regression involves determining the slopes for each of the independent variables while simultaneously adjusting for the slopes of the other independent variables. When we hold constant the slopes of the other variables we are able to get what is referred to as _partial coefficient_ (_b_). Each coefficient represents the amount of change in Y (the dependent variable) that can be associated with a given change in one of the X's, when the other independent variables are held constant.

In making the logarithmic transformations of the data (in order to meet the _homoscedasticity_ assumption) the form of the equation is transformed so that the variables are related multiplicatively rather than linearly. The form of the equation is:

$$Y = aX_1^{b_1} \cdot X_2^{b_2} \cdot \cdot \cdot X_k^{b_k}$$

In our research we will utilize what is referred to as a 'stepwise multiple regression' program. In this program all the relevant variables are fed into the computer and the partial coefficients are calculated for all the variables, as well as the multiple R and the regression constant. A t test is then employed to drop out the variables, one at a time, until only significant variables remain. After each variable is dropped out, the partial coefficients, etc., are re-calculated.

An Introduction to Canonical Correlations. In the second chapter we argued that, according to our formulation of exchange theory, the individual would attain psychic and exchange equilibrium through exchanges in the human, non-human, and ego-exchange systems. If this theory has any merit at all it should be possible to predict student's behaviors and sentiments from a knowledge of the stimuli presented by their courses, professors, and peers. These various exchange systems should be predictable from one another and, moreover, the total system (including all the dependent and independent variables) should be in a more-or-less equilibrious state.

Although they have received little attention from behavioral scientists, cannonical correlations provide a method for dealing with the relations between systems of variables. And if we are ever to deal complex exchange relations, there is no doubt that more attention will have to be paid to the development of canonical correlations and other similar techniques. The conclusions that we will draw from our use of canonicals will be most tentative since they are not fully understood.[11]

The linear form of the canonical equation may be expressed as:

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[11] For discussions of canonical correlations and some of their uses see P. Horst, "Generalized Canonical Correlations and Their Application to Experimental Data," Journal of Clinical Psychology, Monographic Supplement, No. 14 (1961), 26, 129-150; L. R. Tucker, "Determination of Parameters of a Functional Relation by Factor Analysis," Psychometrika, Vol. 23 (1955), pp. 19-23; D. W. Seibel, "The Prediction of Qualities of Interaction Between Teachers and Pupils," Unpublished doctoral dissertation, Harvard University, 1955; R. D. O'Hara and D. W. Tiedeman, "Vocational Self-Concept in Adolescence," Journal of Councelling Psychology, Vol. 6 (1959), pp. 292-301; and T. L. Kelley, "Talents and Tasks," Harvard Educational Papers, No. 1, 1940.

$$\underline{b}_1Y_1 + \underline{b}_2Y_2 + \ldots + \underline{b}_kY_k = \underline{b}_5X_5 + \underline{b}_5X_5 + \ldots + \underline{b}_kX_k$$

Or in the multiplicative form:

$$Y_1^{b_1} \cdot Y_2^{b_2} \cdot \cdot \cdot Y_k^{b_k} = X_1^{b_8} \cdot X_2^{b_9} \cdot \cdot \cdot X_k^{b_k}$$

According to Cooley and Lohnes, the canonical correlation "is the maximum correlation between linear functions of the two sets of variables."[12] The computation procedure produces values for the b's which maximizes the correlation between the two sets of variables. In addition, various sets of b's may be calculated which are orthoganal to the first one calculated.

If in our analysis we find reasonably high correlations between the various sets of variables, this would argue for the equilibrium model posited. And as with our analysis using multiple regression, we will make log transformations to meet the homoscedasticity assumption.

The general procedure for arriving at the canonical correlations is to determine the correlations between the set of dependent variables and then to do the same for the set of independent variables. The next procedure involves calculating the intercorrelations between the two sets. From these correlations it is then possible to compute the values for the weights of the various variables so as to maximize the correlation between the two systems of variables. It is also possible to calculate the significance level of such correlations using a formula presented by M. S. Bartlett.[13] Since the mathematics underlying canonical correlations is complicated we will not attempt to present them here.[14]

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[12] William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences, New York: John Wiley & Sons, 1962, p. 35.

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[13] M. S. Bartlett, "The Statistical Significance of Canonical Correlations," Biometrica, Vol. 32, 1941, pp. 29-37.

[14] For a good introductory discussion see William A. Cooley and Paul E. Lohnes, Multivariate Procedures for the Behavioral Sciences, New York: John Wiley, 1962, pp. 35-45. Also see: Harold Hotelling, "Relations Between Two Sets of Variables," Biometrica, Vol. 28, (1961), pp. 321-77; Godfrey Thomson, "The Maximum Correlation of Two Weighted Batteries," British Journal of Psychology, Statistical Section, Part I, pp. 27-34.

CHAPTER IV

Exchange Systems and the Allocation of Effort Among Courses

I. INTRODUCTION

In this chapter we will discuss the variables that pre-predict effort-allocations. Before we begin our consideration of this problem, a word about the data is in order. In preliminary analysis, we attempted to predict effort-allocations by analyzing the freshmen data separate from that of the seniors. However, we found that by doing so, we could only account for 63 per cent of the variance for freshmen and about 75 per cent of the variance for the senior students. With the considerable preparation for the research and with the care taken in the measurement of the variables this result was disappointing. Although it was known that we would not achieve the kind of explained variances typically reported by the psychophysicists (95 to 99 per cent), we had hoped to do better. In cases where the explained variance is lower than expected, one area to look to is that of significant variables left out of the analysis. We decided that different variables might be controlling the effort-allocations of males as compared to females. This possibility was checked, and we found we could get better prediction for all but the freshmen girls. With the control for sex introduced, we could account for 61 per cent of the variance for the freshmen girls but for the other cohorts, the R^2's varied from 78.9 to 85.5 per cent--closer to what we had hoped would be possible. It is this data that is reported in this paper.

Given the fact that we were unable to average out measurement error (except through averaging the two measurements of the main dependent variable) the explained variances are respectable. Indeed, as Miller has pointed out in a study he made of published results in the American Sociological Review of 1961, the average significant relation reported accounted for something like 10 per cent of the variance: the weakest relationship reported was .1 per cent while the strongest was .58 per cent.[1] Our results indicate, then, that we are at least on the 'right track' in accounting for variations in our dependent variable.

In the case of the freshmen females, we may well have omitted a significant variable, or variables. Moreover, it is to be noted that the measurement obtained for this cohort was not as accurate as it was for the other cohorts. Their reliability was .81 while for the other three cohorts the reliability varied from .86 to .93. The inference may be made, therefore, that the possible omission of relevant causal variables and the failure to achieve as precise measurement, accounts for the fact that we were not able to get as accurate a picture of freshmen girls' effort-allocations as we were for the other cohorts studied.

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[1] Quoted in Hamblin, "Ratio Measurement, " op. cit., p. 3

The relationship among the variables examined here is that of a multivariate power function. That is, through the logarithmic transformations of the data, we have transposed the linear regression model into a multiplicative one. While the linear form of the equation would be:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots b_kX_k$$

The logarithmic transformations result in:

$$Y = a\, X_1^{b1} \cdot X_2^{b2} \cdot X_3^{b3} \dots X_k^{bk}$$

There are two reasons why the multiplicative model is utilized rather than the more traditional additive one. First, in order to meet the assumption of homoscedasticity (error normally distributed) we had to make logarithmic transformations since data collected via magnitude estimation provides log-normal data. That is, as the magnitude of the continum being measured increased, the error in estimation increases as a log function of the magnitude. In the second place, there is growing evidence that, in fact, social-psychological variables tend to combine in a multiplicative rather than a linear fashion.[2]

II. EFFORT-ALLOCATIONS

In Chapter II we suggested that the amount of work a student does in any course will depend on four exchange systems. The proposed systems were that of (i) professor-student exchanges, (ii) course-student exchanges, (iii) peer-student exchanges, and (iv) ego-exchanges. Apparently, all of these systems are relevant to effort-allocations but there are marked differences between the freshmen and senior students, as well as between the sexes. (See Table 4, p.

As might be expected, the freshmen students were not particularly influenced in their effort-allocations by their

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[2] Cf. Hamblin, "Ratio Measurement," op. cit.

Table 4. Proportion of Variance Explained in Effort-Allocations by the Four Exchange Systems, Freshmen and Seniors, by Sex

EXCHANGE SYSTEM	FRESHMEN Males	FRESHMEN Females	SENIORS Males	SENIORS Females
Professor-Student Exchanges	4.9	-*	23.4	24.6
Course-Student exchanges	24.2	27.0	39.0	13.4
Peer-Student Exchanges	18.6	19.2	12.9	30.6
Ego-Exchanges	32.8	14.7	10.1	10.4
TOTAL EXPLAINED VARIANCE	80.7**	61.0	85.5	78.9

*No significant variables in this category survived the stepwise regression analysis. The method by which the per cent contributions of variables is calculated will be discussed in section III of this chapter.

**Rounding errors account for the failure of columns to total exactly.

professors. Indeed, for the females, none of the professor-characteristic variables turned out to be significant and for the males only one of them did, and it was negative. Among the seniors, where presumably there is greater contact between the students and the professors, about one-quarter of the students' allocations of effort were related to professor characteristics. Course-exchange variables were important for both the freshmen and the senior students and, with one exception (senior females), this exchange system accounted for more of the variance in effort-allocations than did any of the other systems. Peer-exchanges turned out to be more important than we had anticipated. Here we find contributions ranging from 13 to 31 per cent for the senior males and females respectively. Finally, ego-exchanges were relevant for all the cohorts, and particularly for the freshmen students.

Generally, the sexes were about equally influenced by the various exchange systems. Among the freshmen the only marked difference between the males and females was in the importance of ego-exchanges in the allocation of efforts. For the males about one-third of the variance was explained by ego-exchanges while for the females about 15 per cent was found to be related to ego-exchanges. Among the seniors, the males were more influenced by course-exchanges (39 per cent) than were the females (13 per cent). The females apparently are more influenced by peer exchanges since 31 per cent of their allocations of effort were based on such exchanges while for the males the figure was 13 per cent.

Professor-Student Exchanges. Let us now consider the specific variables that accounted for variation in effort-allocations among the students. First we will deal with the professor-characteristic variables. Table 5 (p. 103) indicates which of the 32 variables were significant in predicting effort-allocations. It is interesting to note which variables were not significant in predicting our dependent variable. Effort-allocations were not significantly related to (1) how easy it is to get a good grade from a professor, (2) to how good the professor's ideas are, (3) to how entertaining a professor's lectures are, (4) to the relevance of his lectures for final examinations, (5) to the amount of personal contact with the professor; or (6) to the student's desire for the professor's approval. In general, effort-allocations appear to be more related to the personal qualities of the instructor (individual attention, personal praise, friendliness) than to his teaching abilities

Table 5. Summary Table Indicating Proportion of
Variance Accounted for in Effort-Allocations for all Variables & Cohorts

VARIABLE	FRESHMEN		SENIORS	
	Male	Female	Male	Female
PROFESSOR-STUDENT EXCHANGES:				
How fairly prof. treats student (1)	-*	-	-7.2	-
Ease in getting good grade from prof. (2)	-	-	-	-
How good prof.'s ideas are (3)	-	-	-	-
Individual attention from prof. (4)	-	-	-	7.8
Prof. preparing student for career (5)	-	-	-	-5.8
Prof. meeting student's expectations (6)	-	-	-	-5.5
How entertaining prof.'s lectures (7)	-	-	-	-
Relevance of lectures for exams (8)	-	-	-	-
Personal praise from prof. (9)	-	-	4.0	-
Personal contact with prof. (10)	-	-	-	-
Amount prof. likes student (11)	-	--	-	5.5
Student's satisfaction with grades (12)	-	-	-	-
Student's expectations of prof. (13)	-4.9	-	-	-
Student's desire for prof.'s approval (14)	-	-	-	-
How well prof. plays role of prof. (29)	-	-	3.7	-
How friendly prof. is (42)	-	-	8.5	-
COURSE-STUDENT EXCHANGES:				
Work required in course (15)	18.2	15.4	28.3	13.4
Amount learned in course (16)	-	-	5.9	-
Course's relevance student's career (17)	-	-	-	-
Difficulty of course (18)	6.0	11.6	-	-
Interest of course subject matter (19)	-	-	-	-
Expectations of course (20)	-	-	-4.8	-
How well student will do in course (24)	-	-	-	-
Competition for good grades (43)	-	-	-	-
PEER-STUDENT EXCHANGES:				
Work friends expect student to do (21)	8.7	8.4	8.1	23.6
Well friends expect student to do (22)	-4.0	-	-	7.0
Amt. student wants friends' approval (36)	-	10.8	-	-
Friends' approval for good grade (37)	-5.0	-	4.8	-
EGO-EXCHANGES:				
Work student thinks he should do (23)	11.6	-	10.1	-
How well compared to others in course (25)	8.6	14.7	-	-
Ambition to get good grade (26)	6.2	-	-	-
Pleased if got good grade (38)	-6.4	-	-	10.4
TOTAL VARIANCE EXPLAINED	80.7	61.0	85.5	78.9
OBSERVATIONS (COURSES)	134	146	135	134
DEGREES OF FREEDOM	123	140	124	125

*Variables having a dash (-) opposite them were thrown out as not controlling a significant proportion of the variance in the stepwise regression analysis. The method by which per cent contributions of variables is calculated is discussed in section III of this chapter. Rounding errors account for fact that columns do not total exactly.

and qualities (ideas, relevance of lectures, entertainment value of lectures). Apparently a professor's teaching qualities are not as important as are his personal relationships with the students in inducing student exchanges in the form of working hard for the professor. Indeed, this finding is in line with our seventh theoretical proposition as stated in Chapter II (p. 47):

> The more immediate the exchange system for a given behavior, the more influence it will have upon the behavior of the individual.

We would argue that the giving of personal praise or permitting personal contact with the student is more likely to encourage reciprocation of all sorts, including working behavior on the part of the student, than, for example, providing the students with exciting lectures. Furthermore, since the freshmen students were not influenced much by any of the professor characteristic variables, and since freshmen typically have less contact with their professors, we may conclude that the immediacy proposition is indeed relevant to exchange behavior.

The most important single variable for the senior males in predicting effort-allocations is the friendliness of the professor. In addition, the amount of personal praise from the professor, and the better the professor plays the role of professor, the harder the student works in the course. One variable which has a negative exponent is the fairness of treatment the student receives from the professor. Generally, one would predict that effort-allocations would decline if the student were unjustly treated by the professor. (Homans' second proposition: "The more often within a given period of time a man's activity rewards the activity of another, the more often the other will emit the activity."[3]) However, the distributive justice proposition suggests that if a person is unfairly treated, he will be angered. In the situation of unjust treatment we can expect that the actor will either withdraw from the system or else try to change the system into one of justice. Among the seniors, it appears that if they are unfairly treated that they work harder in an attempt to gain the rewards offered by the system.

Reciprocation was generated among the senior girls especially when individual attention and amount of personal contact with the professor increased. These students appear to work hard to maintain such behaviors on the part of the professor. To be noted also is the fact that there were two variables with negative expondents among the girls. These were the extent to which the professor was preparing the student for her future career and the extent to which the professor meets with the student's expectations. Here it would appear that if the professor does not prepare the student for her career, or does not live up to her expectations, she will work harder.

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[3] Homans, Social Behavior, op. cit., p. 53.

It is to be noted that students may reciprocate with their professors in many ways--one of which is the amount of work they do in his course. They may reciprocate by participating in class discussions, by not being critical of the professor, by showing the professor respect, and by attending lectures frequently. In the next chapter we will further examine some of these exchanges through the use of canonical correlational analysis. We would expect, however, that there will be an equilibrium between the professor characteristic variables and the exchange variables; we would expect, in short, to be able to predict one set from the other.

Course-Student Exchanges. When dealing with the question of effort-allocations and course characteristics, we are dealing with non-human exchanges. That is, one of the components (i.e., the course) in the exchange is part of the non-human environment of the social actor. Among the exchanges that a student can engage in with a course is in having feelings of liking or disliking of the course (an indirect exchange), in being critical of the course (indirect exchange), in rating the course highly (indirect, again), or in working a certain amount in the course (a direct exchange). On the other side of the exchange, the course may provide the student with knowledge, it may be relevant to the student's career, it may be intrinsically interesting, and so forth.

What we are interested in here are the variables that earn student reciprocation in the form of varying degrees of effort put into each of his courses. In short, we are asking what are the cross-pressures stemming from the course which will tend to produce significant variation in effort-allocations.

Variations in the amount of effort put into various courses does not appear to be related to the relevance of the course for the student's future career. Surprisingly, this variable was not even significant for the seniors--

most of whom were in their final semester of university. Similarly, the student's interest in the subject matter of the course did not bring about reciprocation on the part of the students in the form of work behavior. How well a student expected to do in the course, and the amount of competition for good grades in the course did not have a significant influence on the work allocations of the students studied.

The major variable controlling work behavior was, in fact, the amount of work required by the course. Students, it appears, devote more time to those courses if they are made to do so: if the course requires a lot of work, the student will tend to allocate his energies in such a way as to take this into account. This variable accounted for from between 13 and 28 per cent of the variations in effort-allocations in the four cohorts.

Among the freshmen students, the only other relevant variable in predicting differential work behavior was the difficulty of the course. For the freshmen, the exchange appears to be relatively straight-forward: the more difficult the course, and the more work demanded of the students, the more work they do in the course. The notion that students work harder in subjects in which they are interested appears to be little short of a romantic ideal. Instead, they parcel out their energies on the basis of the demands made upon them.

Among the senior males, effort-allocations were also influenced by the amount being learned in the course (5.9 per cent). The causal connection may be open to criticism here, however, since it is probably true that the more a student works in a course, the more he learns. Nonetheless, an exchange explanation may be offered. The student is exchanging work for learning. Presumably, if the student was not learning, he would not find work reinforcing. As with professor-student exchange systems a negative exponent characterized one of the variables. Here we found that the more the student expected of a course, the less he worked. (The reader will recall that a similar finding emerged from the analysis of the professor-student exchange system among the senior females, where the higher the expectations of the professor the less the student worked.) One interpretation of this kind of finding is that if one expects a lot of a course or professor and the expected fruits are not borne, negative reciprocation occurs in the form of working less hard in that course. Among the senior females, the only variable relevant to effort-allocations is the amount of work required by the course.

The immediacy proposition would appear to be relevant to course-student exchanges: the more immediate the demands (such as difficulty of course or work required in the course), the greater the influence in effort-allocations. In short, the course characteristics most influencial in differential work behavior are the immediate and direct ones, those which form the contingencies for a good grade.

Peer-Student Exchanges. By 'peers' we limit ourselves to a student's friends in each of his classes. The reason for not including peers outside the class was that we thought that in terms of specific effort-allocations, peers outside the class would exert little or no influence. They might influence how hard a student works in general but not in how he allocates his energies among his various courses.

The notion underlying peer exchanges was that peers might have expectations, or norms, as to how hard a student should work in a course. We considered four variables that we thought might influence effort-allocations. These were: (1) how much work friends in each class expect the student to do, (2) how well friends (in each class) expect student to do, (3) the amount that the student would like to earn his friends' approval (in one class compared to his other ones), and (4) the amount of approval from friends (in each class) that the student would get if he got a good grade in that class.

In general, we would expect that if a student's peers place value on good grades and if they hold norms about the amount of work that one should do in a class, then these variables should be of greater importance in the allocation of efforts than would the professor-exchanges which, once again, are probably more remote than the peer influences. This expection was fulfilled. The only exception was among the senior males for whom the professor exchanges apparently were of greater influence than exchanges with the peers. For the other cohorts, peer exchanges had a greater influence than professor ones. It may well be that peer expectations among the senior males are not as crystallized as they are for the other cohorts. Alternatively, we can say that the professor characteristic variables are particularly influential among the senior males.

Peer exchanges accounted for from between 13 and 31 per cent of the variation in effort-allocation. The only variable that was significant for all of the cohorts was the amount of work that a student's friends expect him to do. This variable was particularly influential among the senior females (see Table 4, p. 100) where it accounted for some 24 per cent of the variation in effort allocation. For the other cohorts, the influence of this variable was between 8 and 9 per cent. For the senior females, the friends' expectations as to how well the student would do in the course also provided a significant pressure and produced 7 per cent of the variance in effort-allocations. Among the senior males the amount of approval for good grades (5 per cent) and how much work friends expect the student to do (8 per cent) were the two significant influential variables. Among the freshmen females the amount that the student wanted to earn the approval of friends accounted for 11 per cent of the variance in effort allocations while 8 per cent came from friends' expectations as to how much work should be done. Curiously, the freshmen males were negatively influenced by the amount of approval for a good grade (-5 per cent) and by how well friends expected the student to do (-5 per cent), but positively influenced by peers' expectations as to the amount of work that should be done (9 per cent). Are we to conclude that freshmen males find peer approval unrewarding? Do they in fact avoid it? Is it possible that among the freshmen males approval is given for low grades? Perhaps to earn approval, freshmen males conform to the gentlemen's 'C' norm: that is, they get approval for a low grade. Similarly, if their peers expect them to do well in a course, they work less hard in it to conform to their expectations. These are possible explanations but more inquiry will be required to confirm or disconfirm them.

Generally, it appears that peer exchanges are influential in effort-allocations. Students, it seems, exchange a certain amount of work for the approval or disapproval of their peers.

Ego-Exchanges. As argued in the theoretical chapter, a pressure on an individual's behavior comes from his own attitudes and self-concept. For example, if an individual sees himself as an honors student, then in order to reaffirm this image we might predict that he will be under some pressure to make his work habits conform to best facilitate the support of his self-image. If the student imagines himself to be a good science student, then we would predict that in allocating his efforts among his courses, he will be under some pressure to ensure that he devotes enough time to his science courses so as to reaffirm his self-concept. We also thought that students probably have some notion as to how good they are as students compared to their class-mates. Again, if they think they are in the upper portion of their class in ability, then this will provide some pressure to work so as to maintain this self-image.

In all, we measured four variables that we thought might be relevant in effort-allocations and which we conceive of as ego-exchanges. These are: (1) amount of work the student thinks he should do in a course, compared to his other courses; (2) how well he thinks he will do compared to other students in the course (compared to how well he will do compared to students in his other courses); (3) how ambitious he is in each of his courses to get a good grade; and (4) how pleased he would be if he did get a good grade in one course compared to his other courses.

Ego-exhcnages turned out to be particularly important for the freshmen males (33 per cent of the variance) and to a lesser extent for the other cohorts. For the freshmen males all the variables had some influence on effort-allocations. The amount of work the student thought he should do accounted for 12 per cent of the variance; how well the student thought he would do in comparison to others in the class accounted for 9 per cent of the variance, while 6 per cent was accounted for by the student's ambition to get a good grade. It also turned out that how pleased a student would be if he got a good grade was a negative influence. Once again, it may be that the causal sequence might be reversed: if a student was doing no work in a course then he would be very pleased if he got a good grade. Presumably, if a student was working hard he would expect a good grade and might therefore not value it as much.

For each of the other cohorts only one of the four variables was relevant to effort-allocations. For the freshmen females, hard work appears to result when they think they will do better than most of the other students in the class (15 per cent of variance). Here the exchange is one of exchanging work to reaffirm one's notion of where one fits into the grade hierarchy of the class. For the senior males 10 per cent of the variance was controlled by the amount of work the student thought he should do in the course. Finally, for the senior girls, the more pleased with the good grade, the harder the student would work to earn it. This variable controlled 10 per cent of the variance in effort-allocations for the senior girls.

III. FINAL NOTE

While it was possible to account for a good deal of the variation in effort-allocations, it is to be noted that the amount of work a student does in a course is only one of many behaviors that he can engage in to maintain himself in an equilibrious relation to the various relevant exchange systems. Indeed, working behavior on the part of the student is a primary exchange and, as we proposed in our theoretical model, many exchanges may, in fact, be going on at the secondary level. We will have occasion to examine some such exchanges in the chapter to follow.

Since our research was non-experimental in design, the extent to which we were able to account for variations in the dependent variable was high--high, that is, compared to the usual sociological fare. For the four cohorts, the explained variances ranged from 61.0 to 85.5 per cent. And if we could estimate the proportion of variance unexplained due to measurement error, our total estimates of variance explained might fall somewhere between 78 and 93 per cent.[4] There is no doubt, especially in the case of the freshmen females, that we failed to consider all of the relevant causal variables. Furthermore, there is the influence of individual

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[4] One way in which we have attempted to make an estimate of the measurement variance will be noted here. A word of caution, however, is in order. In making the estimate we have made two assumptions: (i) that the reliability coef-

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ficient based on the first and second estimates for the same variable reflect the measurement error for all the variables and (ii) that by taking the average of the two measures on the dependent variable had the effect of cutting in half the measurement error of that variable. For each cohort we have calculated the measurement variance using the following formula, which is based on the above two assumptions:

$$\text{Measurement variance} = 1 - \left[r_c + \left(\frac{1 - r_c}{2} \right)^2 \right]$$

Where r_c represents the reliability estimate based on the correlation of the estimates for the question that was asked twice during the collection of the data. The correlations were as follows:

i) freshmen males	.9268
ii) freshmen females	.8139
iii) senior males	.9191
iv) senior females	.8565

Applying the formula, we got estimated measurement variance of:

i) freshmen males	.0719 (7.2 per cent)
ii) freshmen females	.1775 (17.8 per cent)
iii) senior males	.0794 (7.9 per cent)
iv) senior females	.1387 (13.9 per cent)

Using the above method, we may summarize the explained variances for each of the four cohorts.

	FRESHMEN		SENIORS	
	Males	Females	Males	Females
EXPLAINED VARIANCE	80.7	61.0	85.5	78.9
MEASUREMENT VARIANCE EST.	7.2	17.8	7.9	13.9
UNEXPLAINED VARIANCE	12.1	21.2	6.6	7.2
TOTAL	100.0	100.0	100.0	100.0

variability between the subjects. What we have provided is a prediction of effort-allocations in general, without taking into account differential values on the part of the students. Some may value grades while others are more responsive to peers. However, it is to be noted, that the relatively high explained variances would indicate that the individual variations are perhaps not as important as we might think.

The advantage of using the particular approach we have used in the analysis of the data is that if we were simply to

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Another point to be noted is that in multiple regression, the weighting of the variables via the b coefficients represent the best fit. If another cohort were drawn from the campus we could expect some shrinkage in the multiple R if we applied the b's from the present cohort to the new one. To estimate the new multiple R, the following formula may be used:

$$R^i = \sqrt{\frac{(N - 1)R^2 - (n^i - 1)}{N - n^i}}$$

where R^i is the new multiple, N is the number of cases, and n^i is the number of variables. (See Philip H. DuBois, An Introduction to Psychological Statistics, New York: Harper & Row, 1965, p. 185.) If we were to select four more cohorts, each with the same number of course observations as our original ones, the shrinkage would be minimal: using the formula presented by DuBois the amount of variance explained in the new cohorts would be:

i)	freshman males	79.3
ii)	freshmen females	60.0
iii)	senior males	84.7
iv)	senior females	77.7

Generally, the estimated shrinkage is less than 1.0 per cent in the R^2.

ask students what variables effect their effort-allocations, no doubt we would find considerable variation in student opinion in the matter. By using multiple regression we are able to simultaneously adjust for the contribution of each of the independent variables measured and were also able to make statements about the proportion of variance controlled by each of the variables.[5] By having the subjects provide estimates on a number of independent variables which we had theoretical reasons for thinking might be relevant to effort-allocations, we were able to assess the relative contribution of each without having the subjects being aware of what our dependent variable was. For those readers interested, Tables 8 through 11 are presented (pp. 121-124) which provide detailed information on the weighting

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[5] The method by which the per cent contribution made by each of the variables is based on a paper by Robert L. Hamblin, "Apparent Versus Underlying Relationships," (Report Number 1, Mimeographed, Washington University, St. Louis, Missouri, n.d.), pp. 12-14. His formula is:

$$\text{Per Cent Explained Variance} = \frac{|B_i| \cdot R^2}{\sum_{i=1}^{k} |B_i|} \cdot 100$$

B_i equals the Beta weight; R^2 is the total variance explained. This technique of calculating contributions of variables has been used throughout this paper.

of the various variables, on the t values for the significance of the Betas, and the partial correlations with the dependent variable.

We are now ready to consider an analysis of the exchange systems utilizing canonical correltions.

Table 6. Variables Significant in Predicting Effort-Allocations for Freshmen, Males

VARIABLE	b Coefficient	Beta	t Value	Partial r	Per Cent Contribution
How good student expected prof. would be (13)	-.179	-.134	-2.960	-.258	-4.9
Amount of work required in course (15)	.521	.503	6.981	.533	18.2
How difficult course is (18)	.195	.165	2.425	.241	6.0
Amount of work friends expect student to do (21)	.201	.241	4.178	.353	8.7
How well friends expect student to do (22)	-.218	-.139	-2.682	-.235	-4.9
Amount of work student thinks he should do (23)	.401	.318	4.503	.376	11.6
How well student thinks he will do compared to others (25)	.351	.238	4.221	.356	8.6
How ambitious to get a good grade (26)	.225	.171	3.358	.290	6.2
Amount of friends' approval for good grade (37)	-.190	-.139	-2.541	-.223	-5.0
How pleased if student got good grade (38)	-.216	-.177	-2.898	-.253	-6.4
				TOTAL VARIANCE EXPLAINED	80.7

Total Variance Explained	.80664
Standard Error Dependent Variable	.14353
Regression Constant	-.22333
Degrees of Freedom	123
Observations (Courses)	134
Significance of R	.001

Table 7. Variables Significant in Predicting Effort-Allocations for Freshmen, Females

VARIABLE	b Coefficient	Beta	t Value	Partial r	Per Cent Contribution
Amount of work required in course (15)	.383	.316	4.626	.364	15.4
How difficult course is (18)	.374	.240	3.736	.301	11.6
Work friends expect student to do (21)	.209	.172	2.853	.234	8.4
How well student will do compared to others (25)	.740	.304	5.674	.432	14.7
Amount student wants friends' approval (36)	.232	.223	4.056	.324	10.8
			TOTAL VARIANCE EXP.		61.0

Total Variance Explained	.60987
Standard Error Dependent Variable . . .	.28019
Regression Constant	-2.00529
Degrees of Freedom	140
Observations (Courses)	146
Significance of R	.001

Table 8. Variables Significant in Predicting Effort-Allocations for Senior, Males

	b Coefficient	Beta	t Value	Partial r	Per Cent Contribution
How Fairly professor treats student (1)	-.254	-.156	-3.622	-.309	-7.2
Amount of personal praise from professor (9)	.035	.085	2.232	.197	4.0
Amount of work required in course (15)	.517	.610	11.720	.725	28.3
Amount learned in course (16)	.104	.128	2.559	.224	5.9
Expectations of course (20)	-.084	-.103	-1.993	-.176	-4.8
Work friends expect student to do (21)	.117	.176	3.286	.283	8.1
Amount of work student thinks he should do (23)	.225	.218	4.143	.349	10.1
How well professor plays role of professor (29)	.058	.081	2.009	.178	3.7
Amount of friends' approval for good grade (37)	-.076	.103	-2.066	-.182	4.8
How friendly professor is (42)	.183	.183	4.133	.348	8.5
			TOTAL VARIANCE EXPLAINED		85.5

Total Variance Explained	.85472
Standard Error Dependent Variable	.12710
Regression Constant	.33020
Degrees of Freedom	124
Observations (Courses)	135
Significance of R	.001

Table 9. Variables Significant in Predicting Effort-Allocations for Senior, Females

VARIABLE	b Coefficient	Beta	t Value	Partial r	Per Cent Contribution
Amount of individual attention from professor (4)	.111	.155	3.307	.284	7.8
Extent professor is preparing student for career (5)	-.092	-.116	-2.424	-.212	-5.8
Extent prof. meets with student's expectations (6)	-.110	-.109	-2.071	-.182	-5.5
How much prof likes student (student's perception) (11)	.133	.109	2.240	.196	5.5
Amount of work required in course (15)	.284	.267	3.217	.276	13.4
Work friends expect student to do (21)	.449	.471	6.394	.496	23.6
How well friends expect student to do (22)	.293	.139	3.170	.273	7.0
How pleased if student got good grade (38)	.243	.208	3.445	.294	10.4
			TOTAL VARIANCE EXPLAINED		78.9

Total Variance Explained	.78935
Standard Error Dependent Variable	.20310
Regression Constant	-.68167
Degrees of Freedom	125
Observations (Courses)	134
Significance of R	.001

CHAPTER V

Exchange Systems and Canonical Correlations

I. INTRODUCTION

The theoretical basis of this dissertation insists on the necessity of dealing with numerous independent and dependent variables simultaneously. Primary and secondary exchanges involve the notion that people may engage in both simultaneously. Unless we are able to deal with the variables in various exchange components simultaneously, we will not understand the ways in which equilibrium is attained in exchange relations. To illustrate this point, suppose we imagine a student taking a course from a professor who insists on reading his lectures from a textbook. The student finding such lecturing dull, may reciprocate in many ways: he may, for example, start a conversation with the person sitting next to him; he may yawn when the professor looks at him, or--if our student is especially daring--he may get up and walk out of the class. Here we have examples of more-or-less primary exchanges with the professor, the student's behavior is most probably communicated to the professor. The student may, however, not yet be through with the professor: next time the student visits his family he may be openly critical of his professor. The student's sense of distributive justice has been violated (the professor has not lived up to the student's expectations) and giving vent to his agressive feelings about the professor then will become reinforcing to the student because they allow the student, as it were, to 'get even' with the professor, to achieve equilibrium with him. Indeed, we would argue that the feelings of dislike that our student has for his professor are themselves reinforcing to the student because they not only rationalize the student's bad classroom behavior but they also help balance off the psychic losses that the student is incurring in taking a course from the professor. The above illustration is one in which negative exchanges have come to the fore; this same student may have extremely positive exchanges with his other professors.

While in the previous chapter we were simply interested in locating the exchange variables relevant in the allocation of effort among various courses, our task now is to somehow get at the equilibrium that we suggest exists in exchange relations. The major difficulty is that we must simultaneously take into account the various ways in which the student can reciprocate (the dependent variables) with his professor for his various characteristics. The difficulty is that we have multiple variables on both sides of the exchange.

Canonical correlations provide one method of getting at the problem which we face. Unfortunately, this technique has received very little attention from behavioral scientists, and hence not much is known about them. In part our failure to make more use of canonical correlations probably reflects the fact that in our training we learn techniques that deal with one dependent variable at a time. As a result, we limit the kinds of research questions that we ask to those which we are able to handle with our research technology. It does seem to me, however, that an adequate exchange theory will have to take into account multiple variables on both sides of any exchange.

Owing to the limited use to which canonical correlations have been put, there are still many problems connected with their use. For example, can one take the weightings of the variables as indicating the magnitude of causal importance? Since the calculation involves weightings which maximize the correlation between the two sets, how do spurious variables effect them? Inclusion of inappropriate variables may seriously handicap the possibility of being able to replicate a study and come up with approximately the same weightings. Given these serious limiations, we will limit our use of canonicals to two of our exchange systems: the professor-student exchanges, and the course-student exchanges.

When it was decided that canonical correlations would be used in the analysis of the data, attempts were made to see if it would be possible to perform a stepwise canonical correlation in much the same fashion as the stepwise regression analysis is performed. The advantage of such a procedure would be that insignificant variables would be thrown out. Fortunately, J. Philip Miller of the Washington University Computing Center was working on such a program and had read a paper dealing with the subject at the American Psychological Association's meetings in the fall of 1967. With his assistance, the stepwise canonical correlation analysis was performed on the data reported here.[1]

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[1] Miller's technique involves taking the sums of squares of the partials for the canonicals and then dropping out that variable, on either side of the equation, that has the lowest score. In Miller's technique all variables are eventually dropped out. As a cutting point we used the first canonical partial and tested it for significance and retained all those variables that had significant partials. That is, we stopped at the point where only variables with significant partials remained.

II. CANONICAL CORRELATION ANALYSIS OF TWO EXCHANGE SYSTEMS

In Chapter II we proposed that exchange systems have a tendency toward equilibrium. If this is in fact the case, then by using canonical correlations, we should find that variations in one side of any exchange should be predictable from variations in the other side of the exchange. Hence we would expect, if our theory is correct, that variations in student's exchanges with their professors should be predictable, and balanced by, characteristics of their professors.

Before we begin our presentation of data relating to two of the exchange systems, let us briefly examine the extent to which primary and secondary exchanges were relevant in student reciprocations with their courses and with their professors. By definition, we can consider both the courses' characteristics and those of the professors as constituting primary exchanges. That is, they are communicated to the student, and the fact that students could give estimates of them indicate that they were communicated. Table 10 (p. 130) indicates that both the primary and the secondary exchanges were relevant in students' reciprocations both with their courses and with their professors. The canonical analysis suggests, then, that to a considerable extent, equilibrium

Table 10. Proportion of Variance Controlled by Primary and Secondary Exchanges, by Cohort, Sex, and by System

EXCHANGE SYSTEM	FRESHMEN Males	FRESHMEN Females	SENIORS Males	SENIORS Females
A. STUDENT EXCHANGES WITH PROFESSORS:				
i) Primary Exchanges	25.8*	29.2	52.0	39.1
ii) Secondary Exchanges	45.2	30.8	27.9	36.8
EXPLAINED VARIANCE	71.0	60.0	80.0	75.8
B. STUDENT EXCHANGES WITH COURSES:				
i) Primary Exchanges	67.9	-	52.3	43.2
ii) Secondary Exchanges	-	76.6	31.6	30.9
EXPLAINED VARIANCE	67.9	76.6	83.9	74.1

*Per Cent contributions are based on the addition of the primary and secondary exchange variables listed in Tables 11 and 12. Calculation of per cent contributions was the same as in the case of the regression analysis. Explained variances do not always total exactly due to rounding errors. Variables having a dash (-) opposite them were thrown out in the stepwise canonical analysis as not controlling a significant proportion of the variance.

is maintained through both primary and secondary exchanges. Let us now cast our attention toward the specific exchange systems.

Course-Student Exchange System. We will start with the course-student exchanges because this system involves fewer variables than the professor-student system. The amount of variance that is explained by the weightings of the two sets of variables varies from 68 per cent for the freshmen males to 84 per cent for the senior males. (See Table 11, p. 132). Of the student variables, three are considered to constitute secondary exchanges (how much student likes the course, how highly student rates course, and how critical student has been of the course) and one is a primary exchange (amount of work done in the course). With the exception of the freshmen girls, the major way students reciprocate with a course is by working in it. Among the freshmen girls, reciprocation appears to be more likely to occur in terms of having feelings of 'liking' the course (43 per cent of variance) or by rating the course highly (33 per cent). Perhaps the reason we had difficulty accounting of the freshmen females' allocations of efforts was that they do not use working in a course as a reciprocator to the same extent as do members

Table 11. Canonical Correlation Analysis of
Course-Student Exchanges, Per Cent Contribution of Variables

VARIABLE	FRESHMEN		SENIORS	
	Males	Females	Males	Females
DEPENDENT VARIABLES:				
Amount of work done in course (33)	67.9*	-	52.3	43.2
How much student likes course (39)	-	43.2	12.2	-
How highly student rates course (40)	-	33.4	19.4	30.9
How critical student has been of course (41)	-	-	-	-
EXPLAINED VARIANCE	67.9	76.6	83.9	74.1
INDEPENDENT VARIABLES:				
Amount of work required by course (15)	67.9	-	41.3	40.6
Amount learned in course (16)	-	44.7	15.2	33.5
Extent course is preparing student for career (17)	-	-	13.9	-
Difficulty of course (18)	-	-	-	-
Interest of subject matter of course (19)	-	31.9	13.4	-
EXPLAINED VARIANCE	67.9	76.6	83.9	74.1
Observations (Courses)	134	146	135	134
Degrees of Freedom	1	4	12	4
Chi-Square	150.55	210.14	306.90	222.80
Significance	.001	.001	.001	.001

*The per cent contributions were calculated in the same fashion as were those in the regression analysis. Explained variances so not always total exactly due to rounding errors. Variables having a dash (-) opposite them were thrown out in the stepwise canonical analysis as not controlling a significant proportion of variance.

of the other cohorts. (See Chapter IV.) It is to be noted that being critical of a course is not an important (or even significant) form of reciprocation with a course.

But what are the course characteristics that produce these variations? Again, with the exception of the freshmen females, the most important course characteristic that elicited reciprocation was the amount of work required by the course. For freshmen females, important characteristics were the amount the student is learning in the course and the interest they have in the subject matter of the course.

For the freshmen males, the work required in the course was the most important in bringing about reciprocation. Among the senior males the amount of work required (44 per cent), the amount learned (15 per cent), career preparation (14 per cent), interest of the subject matter (14 per cent), and interest in the subject matter (13 per cent), were the major influences in bringing about reciprocations. The difficulty of the course was insignificant for them.

Among the senior females the amount learned in the course (34 per cent) and the amount of work required (44 per cent) were the major pressures producing reciprocation on the part of the student.

Finally, since all of the canonical R's were significant at the .001 level, we can have confidence that the course-student exchange system is tending toward an equilibrious state. Indeed, two of the people who developed canonical correlations discussed their use to study "the vibration of a dynamical system about equilibrium."[2] As with our analysis of effort-allocations, we might point out here that the measurement variance probably accounts for the fact that the canonical R^2's are not higher than they are. Since we could not even have the advantage of averaging out measurement error on the dependent variable, our measurement variance would be greater than in the case of the regression analysis.

Professor-Student Exchange System. As with the course-student exchanges, we were able to significantly predict student reciprocations from the professor characteristic variables. The canonical R^2's varied from 60 to 80 per cent.

The most important, single form of reciprocation in the cohorts was 'liking' the professor, a secondary exchange. Here the weighting of the variables suggest that this form of reciprocation accounted for from between 26 and 45 per cent of the variation. For the freshmen males, another important form of reciprocation is trying to impress the professor: this variable accounted for 26 per cent of the reciprocation. It is to be noted that working was not a significant form of reciprocation with the professor. This finding supports the regression analysis where it was found that among the freshmen little or none of the variance in effort allocation was accounted for by professor characteristics. And, in general, among all the cohorts reciprocation in the form of work was not particularly common. (See Table 12, p. 136.)

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[2] H. W. Turnbull and A. C. Aitken, An Introduction to the Theory of Canonical Matricies, London: Blackie & Son Ltd., 1932, pp. 171-72.

As in the course-student exchange system, criticism of the course is not an important form of reciprocation. Among the male students reciprocation in the form of trying hard to impress the professor was important (freshmen: 26 per cent; seniors: 25 per cent).

What kinds of behaviors or characteristics on the part of the professors that produced these reciprocations? With the exception of the senior girls, the entertainment value of a professor's lectures appeared to be important in gaining student reciprocation (13 to 19 per cent of the variance for all but the senior girls). The male students were influenced considerably by how good the professor's ideas are:

Table 12. Canonical Correlation Analysis of Professor-Student Exchanges, Per Cent Contribution of Variables

VARIABLE	FRESHMEN		SENIORS	
	Males	Females	Males	Females
DEPENDENT VARIABLES:				
Amount student likes professor (27)	45.2*	30.8	27.9	25.6
Amount of student's class participation (28)	-	-9.1	-	9.8
Student's criticism of professor (30)	-	-	-	-11.2
Respect shown professor by student (31)	-	-	27.2	20.9
Frequency of lecture attendance (32)	-	7.9	-	-
Amount of work done in course (33)	-	-	-	8.4
Amount student tries to impress prof. (34)	25.8	12.2	24.8	-
Student's disruptive classroom behavior (35)	-	-	-	-
EXPLAINED VARIANCE	71.0	60.0	80.0	75.8
INDEPENDENT VARIABLES:				
How fairly professor treats student (1)	-	10.7	22.6	-
How easy to get good grade from professor (2)	-	-	-	-
How good professor's ideas are (3)	20.8	-	20.5	-
Individual attention from professor (4)	-	-9.0	12.9	10.8
Extent prof. is preparing student for career (5)	-	9.1	-	-
Extent prof. meets student's expectations (6)	-	-	-	26.9
How entertaining prof.'s lectures are (7)	19.3	15.9	13.2	-
Relevance of lectures for tests, exams (8)	-	-	-	-
Amount of personal praise from professor (9)	-	-	-	-
Amount of personal contact with professor (10)	16.2	-	-	-
How much professor likes student (11)	14.8	-	10.7	-
Student's satisfaction with grades (12)	-	-	-	-
How well prof. plays role of professor (29)	-	-	-	16.6
How friendly professor is (42)	-	15.4	-	21.5
EXPLAINED VARIANCE	71.0	60.0	80.0	75.8

Table 12 (Continued)

	FRESHMEN		SENIORS	
	Males	Females	Males	Females
Explained Variance	71.0	60.0	80.0	75.8
Observations (Courses)	134	146	135	134
Degrees of Freedom	8	20	15	20
Chi-Square	235.03	255.54	301.75	248.50
Significance	.001	.001	.001	.001

*The per cent contributions were calculated in the same fashion as were those in the regression analysis. Explained variances do not always total exactly due to rounding errors. Variables having a dash (-) opposite them were thrown out in the stepwise canonical analysis as not controlling a significant proportion of variance.

about 20 per cent variance for both the freshmen and senior males. Among the girls, the friendliness of the professor appeared to be important in earning their reciprocation. Here we find 15 per cent of the variance explained for the freshmen and 22 per cent for the seniors.

As with the course exchanges, we were able to predict variance in student reciprocation by the professor characteristic variables. Once again, we may tentatively conclude that this exchange system is in a more-or-less equilibrious state. Both primary and secondary exchanges were important in student reciprocations.

III. FINAL NOTE

The canonical correlation analysis provides support for our theory of human behavior in two ways. First, we argued that exchange systems will tend toward states of equilibrium: since the canonical R^2's were relatively high we may tentatively conclude that equilibrious relations characterized the exchange relations. Second, we argued that primary and secondary exchanges would be relevant and this we found to be the case. In addition, the canonical analysis did indicate one of the possible reasons why we were not able to account for as much of the freshmen girls' allocations of effort as we were able to for the other cohorts. Apparently this cohort is not influenced by their courses in the same way as the other cohorts. For the freshmen girls, reciprocation tends to be in the form of liking a course or rating it highly rather than working hard for it. The other cohorts tended to reciprocate by working.

The two remaining exchange systems were not analyzed using canonical correlations because in each of these we did not include any other variable than the amount of work done as a possible dependent variable. Thus the exchanges with peers and with ego were only thought of in terms of work: the student works to live up to the expectations of peers and his ego.

While we must be extremely cautious in our interpretations of the canonical analysis of the data, the technique does offer exciting possibilities for the analysis of exchange systems. Hopefully, more researchers will employ this method of analysis and along with greater use no doubt will follow greater understanding of it.

CHAPTER VI

Theory and Research: A Discussion of Findings

I. INTRODUCTION: THE EXCHANGE PERSPECTIVE

Exchange theory offers a perspective on human behavior. It argues that human behavior is largely controlled by the consequences that human activities produce. Exchange theory takes the view that if an individual has been rewarded for engaging in an activity, then he will be more likely to engage in that, or in some similar, activity in the future. Social relations are continually being cemented, continually being reinforced, by exchanges between persons. These exchanges may be positive or negative. However, where exchanges become predominantly negative in character, the theory of exchange predicts that the relation will be short-lived, and that there will be pressures to cease the exchange, or to bring it into a more rewarding condition.

As we conceive of it, human exchange involves attempts by actors to achieve profitable and equilibrious relations with others and with themselves. Equilibrious relations may be achieved through both primary and secondary exchanges: by primary exchanges we refer to those behaviors which are emitted, communicated, and acted upon by the other component in the exchange; by secondary exchanges we refer to those in which the behavior or sentiment is not communicated to the other component in the exchange; their importance in human affairs stems from the fact that through them, actors are often able to reduce the costs of unprofitable exchanges. To illustrate this point with an example appropriate to the present study, take the case of the student sitting through a dull lecture: such a student may seek to alter his professor's behavior and may, therefore, start a conversation with his neighbor--attempting, as it were, to indicate his dissatisfaction with the professor's lecture. (In the reward history of the individual he may have found that by talking to his friend, that the professor would change his behavior.) The above illustration is exemplary of a primary exchange with the professor (as well as with the friend). But the student might also decrease the costs of his negative exchange with his professor via secondary exchanges: he might be critical of the professor to his family and friends; by doing so he 'gets even' with the professor. Further, the student might develop a feeling of dislike for the professor--

again, decreasing the costs of the exchange because the student then does not expect to find the professor rewarding.

Above all, exchange relations are to be viewed as dynamic. Individual actors initiate and manipulate the behaviors of others. Indeed, there may well be a norm of equality operating. One is expected to achieve equilibrious relations with those with whom we interact. While there is always a danger of viewing man as a passive receiver of stimuli and then reacting to them, the orientation of exchange theory is one in which the individual becomes a dynamic component--he punishes undesirable behavior, rewards desirable behavior. Perhaps we too often over look the possibility that actors make full use of the cultural tools available to them for the manipulation of the social and physical environment. In our illustration of the student talking in class, if talking in class is considered to be a legitimate means of signaling to the professor that the student is bored, then by engaging in such behavior, the student may bring the professor under his control. The norm of reciprocity may be little more than a cultural expectation that we achieve equilibrious relations with those with whom we interact, a norm which probably has its basis in the socialization of the individual--he has been rewarded for reciprocation, punished for non-reciprocation.

II. MAJOR THEORETICAL COMPONENTS AND THE ALLOCATION OF EFFORT

By human exchange we refer to those actions or sentiments which are emitted or felt by actors and which have a tendency to push toward a maintenance of profit equilibrium with other actors, or to those actions or sentiments that lead to harmony in the internal states of individual actors. This equilibrium may be achieved both through primary and secondary exchanges. In the canonical correlation analysis of professor-student and course-student exchanges we found that both types of exchange relations were relevant to behavior (see Chapter V). The evidence indicates, then, that to fully understand exchange behavior we will have to take into account secondary as well as primary exchanges.

In our theoretical model we stressed the possibility that in dealing with any behavior there exists the possibility of exchanges with the non-human as well as the human environment; in addition, we suggested that ego-exchanges may be relevant to the prediction and understanding of much of human behavior. Our research has indicated that both non-human (i.e., course) exchanges as well as ego-exchanges were relevant to the prediction of effort-allocation, just as human exchanges (i.e., professor and peer exchanges) were also relevant. Table 13 (p.145) indicates the proportion of variance in effort-allocation controlled by the three types of exchange relations. While the proportion of variance accounted for by each type of exchange relation varied with each cohort, the evidence indicates that to account for effort-allocations all of these exchange systems must be taken into account.

One of our major theoretical concepts was that of cross-pressures which we defined as "the pushes and pulls--the attraction and repulsion--of emitting any behavior involving a psychic calculus as to the profits and costs of emitting specific behaviors in the various exchange systems for which the behavior will have consequences." In allocating his efforts among his courses, we argued that a student is under varying pressures to reciprocate with the various exchange systems in which he is involved, and, given limited resources, would have to take into account these pressures. Suppose, for example, that in one course the student is asked to write an essay a week while in another course there is only a final examination. In allocating his efforts, the student may be under more pressure to work in one course

Table 13. Proportion of Variance in Effort-Allocations Accounted for by Type of Exchange System*

TYPE OF EXCHANGE SYSTEM	FRESHMEN Male	FRESHMEN Female	SENIORS Male	SENIORS Female
A. Human Exchanges (Professor & Peer)	23.5	19.2	36.3	55.2
B. Non-Human Exchanges (Course)	24.2	27.0	39.0	13.4
C. Ego-Exchanges (Self)	32.8	14.7	10.1	10.4
TOTAL VARIANCE EXPLAINED	80.7	61.0	85.5	78.9

*This table is derived from Table 4, p. 100. Columns do not total due to rounding errors in calculation. Method by which per cent contributions were calculated are discussed on p. 119.

than in another. However, since the grade may be based on his performance, he must allocate his energies so as to perform at a satisfactory level in both courses. The same point could be made for reciprocations with professors. If one professor gives a student a lot of individual attention (and if the student values such attention) while another pays no attention to him, the student, from the professor-student exchange point of view, is under greater pressure to reciprocate with the first professor than he is to reciprocate with the second one. However, simultaneous pressures might be coming from other sources: the peers in his first class may expect the student to do little work while in the second class, peers might expect the student to work hard. Similarly, if the first course is a chemistry course and if the student sees himself as a brilliant chemist then this will be an additional pressure to work in this course at the expense perhaps of his sociology course which he took simply to fulfill the social science requirement for his degree. The point is that students may be subjected to all sorts of competing demands on his efforts. But how did we take these cross-pressures into account in our research?

The answer to this question lies in the operationalization of the variables themselves. The reader will recall that the way in which we measured the variables involved having the students provide estimates comparing one course to his other courses (setting his other courses to equal 100), his professors with one another, his peers in one class compared to his peers in another class, and his own self-concept in one class compared to his other classes. Thus, we built into the measurement of the variables themselves the notion of cross-pressures. The fact that we were able to account for a good deal of the variations in effort-allocations provides indirect support for the notion that cross-pressures are relevant in effort-allocations; the high explained variances are also suggestive that the theory in general appears to be a sound one. This is not to claim, however, that alternative explanations could not be used in the interpretation of the data.

In Chapter II we presented the Ellis-Hamblin exchange model[1] in order to facilitate the understanding of exchange behavior. The variables in this model are: behavior, reinforcement, exchange stimulus, and instigating stimuli. Let us breifly apply the model to our research to see if it aids in an understanding of the process of exchange. In the past, students will have received varying degrees of reinforcement from various sources for working at various levels, for putting more or less effort into his various courses. If a student's work has been rewarded, then, as indicated by the model, the value of further rewards will temporarily decline but the probability of reinforcement will be increased. In the future, when the student is provided with an opportunity to, for example, write a paper, this instigating stimulus will provide the basis for new efforts in writing the paper: if the exchange stimulus (a particular professor) has in the past rewarded the efforts taken by the student to write a good paper then, other things being equal, the student will put a lot of effort into writing the paper. If the student is again rewarded for his behavior by this professor then this will increase the student's feeling that if he were to engage in the same behavior again, that this behavior would be similarly rewarded. However, the reward of the professor might temporarily decrease the value of that reinforcement; the student would be temporarily satiated on professor rewards. What must be added to the model is some additional box that deals with the fact that a behavior rewarded in one system of exchange may be punished in another. Different exchange systems may reward similar behaviors or they may be the inverse of one another. Professors may reward hard work on the part of their students; peers may punish it. The choice of behavior to engage in then becomes extremely complex. Probably what happens is that the student will work less than the professor expects but more than the peers expect and in this way minimize the costs and maximize the profits in the behavior. Indeed, we would expect that the student would attempt to hide his efforts from his peers (keep up the Gentlemen's 'C' front) but work at writing a good paper and perhaps tell his friends that he dashed it off in two hours.

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[1] See p. 42.

The particular question in which we were interested was in the variables that are the most important in predicting effort-allocations. In short, what characteristics of the student himself, of his courses, of his peers or professors are most salient in rewarding differential work behavior? The data indicated that there was considerable variation in these variables from cohort to cohort. Among the freshmen we found that there was no attempt to reciprocate with the professor through work behavior. This suggests that either students do not value the rewards offered by their professors or else the probability of reinforcement is low. In short, for the freshmen, to work hard probably will not result in reinforcement from the professor. For the freshmen, reciprocation with themselves, with their peers, and with the course itself are more important in controlling differential effort-allocations. In order to earn the rewards offered by the course (presumably a good grade, or learning a lot, or preparing one's self for a career) the student works to earn these rewards. Among the senior students, reciprocation with professors is more important as a reinforcer for work. But self-exchanges, course exchanges, and peer exchanges also appear to be relevant reward systems for working behavior. The specific variables that control--or reward--effort-allocation were discussed in Chapter IV.

III. EFFORT-ALLOCATION DATA AS IT RELATES TO PREVIOUS RESEARCH

In this section we will bring to bear evidence that relates to literature discussed in the first chapter of this paper. Although we have serious doubts as to the sagacity of using zero-order correlations as evidence for the establishment or rejection of hypotheses, we will employ them here only to see whether some of our correlations suggest support for, or denial of, some of the hypotheses advanced by other researchers. The reason why zero-order correlations are to be regarded with some suspicion is that the influence of other variables are not ordinarily taken into account.

In Chapter I, we cited a study by Carl H. Weaver[2] who reported that students' ratings of instructors were directly related to how well the students expected to do in the instructor's course. If the student expected to do poorly in the course, he tended to give his instructor a poor rating, while if the student expected to do well he tended to give the instructor higher ratings. On reviewing their research, we concluded that their findings could be interpreted in an exchange framework: students exchange a good rating of the professor for a good grade from him. In order to see if our data indicated a similar relationship, we took the variable "how well do you think you will do in your ____ course (compared to your other courses equalling 100)?" and related this variable to the extent to which the student's professors lived up to the students' expectations of what professors should be like and to how much the students liked their various professors. Table 14 (p.152) indicates that while the zero-order correlations were all positive, only

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[2] See Weaver, op. cit.

Table 14. Zero-Order Correlations Between
Two Indicies of Professor Evaluations and Expectations
Of Student as to How Well He Will do in Course

VARIABLES[1]	FRESHMEN		SENIORS	
	Males	Females	Males	Females
24 and 6	.105	.267**	.141	.116
24 and 27	.175*	.337**	.137	.325**

[1] Variable 24 measured how well the student expected to do in a course; variable 6 measured the extent to which the professor meets the student's expectations; variable 27 measured the extent to which the student likes the professor.

*With 125 degrees of freedom, r must have a value of .174 to be significant at the .05 level.

**With 125 degrees of freedom, r must have a value of .228 to be significant at the .01 level.

four of the eight correlations were significant. However, the probability of getting 8 positive correlations from random data is .004[3] so that our evidence provides some support for Weaver's finding.

Weaver also suggested, on the basis of his data, that the personality characteristics of the instructor are less important in eliciting favourable evaluations from students than his teaching ability. To relate our data to this hypothesis, we correlated three teaching characteristic variables and the personality variable with the extent to which the professor meets with the students' expectations and with how much the student likes the professor. The results are given in Table 15 (p.154). As an index of personality we used the variable, "how friendly is the professor," while for the teaching characteristic variables we used how good the professor's ideas are (3), how entertaining the professor's lectures are (7), and how relevant the professor's lectures are for tests and examinations (8); for instructor evaluation variables we used the extent to which professor meets students' expectations of what a professor

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[3] This is based on the 'Sign Test'; see Hubert M. Blalock, Social Statistics, New York: McGraw-Hill Book Company, Inc., 1960, p. 131.

Table 15. Zero-Order Correlations Between Indicies of Instructor Evaluations and Indicies of Teaching and Personality Characteristics of Instructors

VARIABLES[1]			Teaching			Personality
			3	7	8	42
FRESHMEN	Males	6	.674**	.745**	.280**	.410**
		27	.736**	.680**	.301**	.517**
	Females	6	.339**	.459**	.464**	.112
		27	.314**	.538**	.396**	.465**
SENIORS	Males	6	.780**	.459**	.359**	.358**
		27	.623**	.534**	.204*	.481**
	Females	6	.666**	.523**	.428**	.416**
		27	.507**	.461**	.280**	.108

[1] Variables are:

6: Extent to which professor meets with student's expectations of what a professor should be like;
27: How much student likes professor;
3: How good professor's ideas are;
7: How entertaining professor's lectures are;
8: Relevance of lectures for tests, examinations;
42: How friendly professor is.

*With 125 degrees of freedom, r must have value of .174 to be significant at the .05 level.

**With 125 degrees of freedom, r must have a vlue of .228 to be significant at the .01 level.

should be like (6) and how much the student likes the professor (27). Table 15 indicates that student evaluations of their instructors is consistently and significantly related to the teaching characteristics of their professors. All but one of the correlations were significant at the .01 level, and it was significant at the .05 level. However, student evaluations of their professors were also related to how friendly the professor is (our operationalization of personality characteristic) but here two of the correlations were not significant. Note that all of the correlations in the table are positive indicating that student evaluations of their professors are related to both the teaching and personality characteristics of their professors. The fact that two of the eight personality correlates were not significant but all of the teaching characteristic variables were significantly related to student evaluations suggests some support for Weaver's contention although the evidence is by no means conclusive. Our evidence suggests that both personality and teaching characteristics are related to student evaluations, although the fact that two of the eight personality correlations were not significant suggests some support for Weaver's contention that teaching qualities are more related to student evaluations than personality characteristics.

Another hypothesis suggested by our review of the education literature is that "the presence of positive incentives lead to more efficient work."[4] We will test this hypothesis by noting the zero-order correlations between the amount of student work done in a course and various variables that might be considered to constitute positive incentives. Table 16 (p.157) indicates the zero-order correlations. It would appear that the presence of positive incentives stemming from the professor is significant for the senior students but not for the freshmen. Our data suggests that positive incentives are relevant to the amount of work done but this is certainly not the only variable of importance. Among the senior students, where there is greater contact between the professors and the students, the presence of positive incentives appears to be relevant to the amount of work done in a course; among the freshmen there does not appear to be any consistent relationship in this matter. Our study indicated that positive incentives may be important if there is a good deal of contact between the professor and student (particularly if this contact is of

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[4] See pp. 13-14.

Table 16. Zero-Order Correlations Between Amount of Work Done in a Course and Various Positive Incentives

VARIABLES[1]	FRESHMEN		SENIORS	
	Males	Females	Males	Females
33 & 3	.102	.259**	.363**	.306**
33 & 4	.024	-.144	.382**	.382**
33 & 7	.136	.292**	.292**	.188*
33 & 8	.092	.146	.248**	.420**
33 & 12	-.037	.303**	.231**	.191*

[1] Variable 33 is the amount of work done in a course;
Variable 3 is how good the professor's ideas are;
Variable 4 is the amount of individual attention from the professor;
Variable 7 is how entertaining the professor's lectures are;
Variable 8 is the relevance of lectures to tests, examinations;
Variable 12 is the student's satisfaction with grades in course.

*With 125 degrees of freedom, an r of .174 is required in order to be significant at the .05 level.

**With 125 degrees of freedom, an r of .228 is required in order to be significant at the .01 level.

a personal nature) but that in allocating efforts among courses one must also take into account the demands made by the course, by the student's peers, and by the kinds of self-expactations that the student holds.

The research conducted by Cogan on student work behavior indicated that teacher characteristics were significantly related to the amount of self-initiated and required work that a student in the eighth grade did. Our research has indicated that unless there is personal contact between the instructor and the student, teacher traits appear to have little salience in producing variations in the amount of work that a student does in a course. We must hasten to point out that our research deals with seniors and freshmen in a university while Cogan's study was based on junior high school students. In any event, his research, and the research reported here, is similar in that both used student evaluations of work behavior and teacher characteristics. While we found instructor characteristics were relevant to the effort-allocations of senior students, such was not the case for the freshmen students studied. The differences in findings no doubt reflects the differences between college and junior high school students, and no doubt also reflects differences in analysis procedures. We employed a regression program which eliminated variables in order of least significance in the prediction of effort-allocations; Cogan relied to a large extent on analysis of variance and zero-order correlations to test his hypotheses.[5]

IV. SUGGESTIONS FOR FURTHER RESEARCH

The issues raised by this dissertation are theoretical first and substantive second. Future research hopefully will direct attention to exchange processes whether they occur in the classroom, among peers, or within corporate structures. One possible avenue of inquiry would be to conduct studies concerned with the processes of primary and secondary exchanges as equilibriating mechanisms in interpersonal relations. Further, interesting questions could be raised as to the extent to which ego and non-human exchanges are relevant to human behavior in general. We might also ask what kinds of behaviors can be almost totally accounted for by primary exchanges? Under what conditions do secondary exchanges come to the fore? Is it possible that secondary exchanges are espectially important in bringing about equilibrious states in those exchanges in which distributive justice is often violated?

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[5] See p. 16.

At the substantive level, further research on effort-allocations might find it worthwhile to replicate the present research. However, modifications in the design of this research can be suggested. Designs which enable the researcher to average out measurement error are to be recommended. Possibly if a number of sets of estimates for the variables examined were to be obtained from each subject, a good deal of measurement error could be eliminated. In addition, future research utilizing magnitude estimations might be well advised to design a method of screening out subjects that are not particularly adept at making such estimates. Perhaps the utilization of some cross-modaility matching technique, such as having subjects draw lines of different lengths to indicate the magnitude of the various variables, would also improve on the reliability of measurement. From the reliability estimate in our research it appears that the freshmen females were not as accurate as we might have hoped, although I must confess that I did not detect uneasiness on their part in providing the estimates. In short, any precedure to improve measurement should be used.

As a further elaboration of the present research, it might prove instructive to design research in which it is possible to move back in the causal chain empirically. This we might refer to as a multi-phase regression analysis. Once having accounted for the variance in a dependent variable by some combination of independent ones, we might then take as problematic what is producing variations in each of the independent variables. In short, we would then treat each of the independent variables as new dependent variables. In this way it may be possible to increase our understanding of the causal networks that are producing variations in both the major dependent variables and in each of the independent variables. With regard to our own research, we might very well wish to find out why the predictor variables for females were different from those of relevance for the males.

At the technical level, it is to be hoped that more research will go into the development of canonical correlations. To facilitate the understanding of complex human exchanges, it will be necessary to utilize procedures that permit the treatment of more than one dependent variable at a time: canonical correlations may, therefore, prove to be critical in broadening our understanding of exchange relations, particularly in cases where both primary and secondary exchanges are relevant in equilibriating interpersonal relations.

V. CONCLUSIONS

Theoretical research may be judged by various criteria. Three of the most important will be considered here. First, there is the question of whether the theory accounts for the data, or behavior that it claims to explain. Here we ask what kind of prediction was obtained utilizing the theoretical model. This is the explained variance criterion. In the second place, the efficiency and simplicity of the theory may be taken as criterion in the sense that good theory should be able to provide simple and direct predictions about the behavior under examinations. This is the simplicity criterion. Finally, research may be judged by the extent to which it provides plausable explanations of the behavior under examination. This is the meaningfulness criterion.

Of these three criteria, it is probably fair to argue that our research has been fruitful on the explained variance and meaningfulness criteria but the simplicity of the explanation perhaps leaves something to be desired. Apparently while the principles of human behavior are reasonably straight forward, the number of variables required to predict the particular behavior of interest in this research were numerous. Hence we are not able to come to a statement or prediction equation that includes only two or three variables.

Taking the criterion of explained variance, our study was able to account for from between 61 and 85 per cent of the variations in students' effort-allocations among their various courses. While we are not proud of the 61 per cent prediction for the freshmen females (although even that level of prediction is not particularly common in sociological research), the other explained variances for the other three cohorts varied within the 79 to 85 per cent range. In general, then, we were able to account for a large and significant proportion of the variation in effort-allocations. Hence the theory of exchange appears to offer exciting possibilities in the explanation and prediction of human behavior.

But what of meaningfulness? Here, of course, one of the difficulties is that what is a meaningful explanation to one person may not be particularly so for another. The reader will therefore have to judge for himself as to whether the theory and the data offer a convincing explanation of the behavior under examination. In general, we have argued that human behavior is largely controlled by the consequences that human activities produce. Further, we argued that exchange behaviors involve attempts by actors to achieve profitable and equilibrious relations with others and with themselves. Such equilibrium is obtained, we argued, through two kinds of exchanges, the primary and the secondary. We also noted that any given behavior may have consequences (both negative and positive) of the individual which stem from numerous exchange systems. One system may reward the behavior, another punish it. The differential rewards and punishments gives rise to cross-pressures on the individual. For the prediction of effort-allocations we argued that professor, peer, course, and ego exchanges all needed to be considered. And we argued that the allocation of efforts among courses will depend on the peculiar array of competing cross-pressures, or competing reward structures, in which each student is involved. The view of human behavior, in short, is that it occurs in a field of alternative rewards and reward systems and that to understand, and to predict, behavior we have to examine these as they relate to each individual. In addition, we argued that in exchange relations, humans have various ways of achieving equilibrious states both with other actors but also in their internal states. Central to this point of view is the notion that such equilibrious states are rewarding in and of themselves and that man seeks to achieve these rewards so as to best profit by his activities.

Given the extent to which the theory was confirmed through the ability to provide fairly high prediction, and given the fact that the theory appears to offer a meaningful explanation suggests that the theory ought to be further examined and refined. It appears to be a good theory.

CHAPTER VII

A Brief Summary

I. INTRODUCTION

The objectives of this research were to examine the exchange processes relevant to the differential efforts students put into their various courses, and to deal with exchange processes in general. In the theoretical chapter, we argued that four exchange systems would be relevant to the effort-allocations of students. These were: professor-student exchanges, course-student exchanges, peer-student exchanges, and ego-exchanges. To earn the rewards offered by these systems, *one* of the behaviors that a student can engage in is to do different amounts of work in his courses. If a professor gives brilliant, exciting lectures then one of the ways in which a student can reciprocate with his professor is to work hard for him. Similarly, if a student finds the subject matter of a course interesting, one of the ways he can reciprocate is to work hard for the course. In the case of course exchanges, however, doing a certain amount of work may be required to earn the rewards of a respectable grade in the course. Peers may have norms about the amount of work a student should do in a course and hence students may reciprocate with their peers (and earn their approval) through working the expected amounts. Finally ego-exchanges may be relevant to effort-allocations. By ego-exchanges we refer to those internal equilibriating mechanisms by which an individual maintains a consonant relation between his self-image, attitudes, and the behaviors in which he engages. If a student sees himself as a brilliant physics student, then there will be some pressure to reciprocate with this self-image, some attempt through his behavior to confirm this self-image. Hence we would predict that if a student sees himself as a good physics student that this will operate as a pressure on him to work hard in that course (perhaps at the expense of his other courses).

In addition, we have proposed that there are two-basic pressures operating in exchange behavior: first, there is the pressure to reciprocate with those components to whom one has a debt, there is a pressure to achieve an equilibrious relation with those we interact with; in the second place, we have argued, that individuals attempt to profit by their behaviors. We have proposed that all reciprocation does not necessarily take a direct form--we may not tell a professor he has just delivered a good lecture--we may, instead, simply develop a liking for the professor. When exchanges are direct we refer to them as primary exchanges, when they are not direct we refer to them as secondary exchanges. Both may function, however, to bring the actor into an equilibrious relation with the other person. In the allocation of efforts we argued that students would be torn because of the pressures to reciprocate, or to earn the profits, offered by the various exchange systems for which work behavior has implications for him. Thus we utilized the concept of cross-pressures and proposed that effort-allocations of students will be proportional to the cumulative pressure-to-work stemming from the various exchange systems for each of the courses in which the student in enrolled. Clearly, some exchange systems might reward hard work behavior while others might punish it.

Our major task in the empirical level was to discover the significant variables in each of the exchange systems that made contributions to the prediction of effort-allocations. At the theoretical level, our job was to account for, or to explain, the relationships discovered.

II. DATA COLLECTION AND ANALYSIS

Data on some 43 variables were collected from 60 freshmen and 60 senior students enrolled at Washington University, St. Louis. Information for the variables on all the 3-unit courses in which the student was enrolled was collected through the use of magnitude estimation procedures. In all data on 280 freshmen and 269 senior student's courses were obtained. Two statistical procedures were employed in the analysis of the data. In an attempt to isolate the variables significant in predicting differential effort-allocations, a multiple regression program with a stepwise option (where insignificant variables drop out, one at a time, until only significant variables remain). In addition, a stepwise canonical correlation analysis was used to examine the exchange processes between professors and students, and between courses and students. Since magnitude estimation procedures provide data where error is log-normally distributed, we made logarithmic transformations of the data. The result of this procedure is to transform linear relations to multiplicative ones. Other research notably that conducted by Robert L. Hamblin, has demonstrated that multiplicative, not linear, relationships appear to best describe the relation between social and psychological variables.[1] The reason why we were forced to utilize the multiplicative model is that in both of the statistical procedures employed, error is assumed to be normally distributed.

III. RESULTS

We found that all three types of exchanges were relevant in the prediction of effort-allocations. Although the proportion of variance controlled by each of the types of exchange varied from cohort to cohort (the four cohorts were freshmen, males and females; seniors, males and females) each type made significant contributions to prediction. Human exchanges (professor and peer) accounted for from 19 to 55 per cent of the variance explained in the various cohorts; non-human exchanges (course) accounted for form between 13 and 39 per cent; and ego-exchanges explained from 10 to 35 per cent of the variance in the various cohorts.

In general, we were able to account from 61 to 85 per cent of the variations in effort-allocation. The 61 per cent was for the freshmen females with whom we appeared to have either failed to include all relevant variables or else received much less accurate estimations. The evidence is that the reliability of their estimates was much lower than for the other cohorts and hence error in measurement may account for our failure to achieve high explained variances for this cohort. For the other cohorts the explained variances were 78.9, 80.7, and 85.5 per cent.

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[1] Cf., Hamblin, Ratio Measurement," op. cit.

We found that freshmen students were not much influenced by any of their professor characteristics in their effort-allocations; among the seniors between 23 and 25 per cent of the effort-allocations were based on professor-student exchanges. Apparently, freshmen do not reciprocate with their professors by working hard for them. The pressures stemming from other exchange systems appear to exert the significant influences. Among the seniors, the personality characteristics of the professor, and particularly the amount of personal attention from the professor, rather than the teaching qualities of the professor appeared to be most salient in earning student reciprocation in the form of differential work allocations.

Course-student exchanges were relevant in predicting effort allocations. The amount of work required by the course was the single most important variable here. Alone, this variable accounted for from between 13 and 28 per cent of the variance explained in the four cohorts. Among the freshmen it was found that the difficulty of the course was also a relevant predictor of effort-allocations. This finding was, in fact, anticipated in our theoretical chapter were we proposed that:

> The more immediate the exchange system for a given behavior, the more influence it will have upon the behavior of the individual.

Evidence in support of this proposition came from both the professor-student and the course-student exchanges. The more personal contact (and personal attributes) of the professor, the more likely the student was to engage in reciprocations in the form of work--presumably personal contact creats higher pressures for reciprocation than, for example, giving a good lecture. Thus, it is no surprise that among the freshmen, where there is little professor contact typically, that professor variables were not relevant in predicting effort-allocations. In a similar vein, the more immediate the demands of the course (amount of work required, difficulty of course) had a significant influence on effort-allocations while such remote variables as a course's relevance for a student's career, or the interest of the subject matter of the course did not make significant contributions to a student's effort-allocations.

A student's classroom peers may, we thought, have certain expectations about how much work a student should do, and we therefore attempted to assess the importance of peers in effort-allocations of students. To earn the respect and acceptance of peers one must conform to their expectations and hence pressures to work--or not to work--might stem from this source. As it turned out, the amount of work peers expected a student to do was a significant influence on effort-allocations, controlling from 13 to 31 per cent of the variance.

Finally, we expected that ego-exchanges might make a significant contribution to the allocation of efforts among students. Such variables as the amount of work that the student thinks he should do in a course, how well he thinks he will do compared to other students in the course, how ambitious he is to get a good grade, and how pleased he would be if he got a good grade were all measured. It turned out that ego-exchanges made independent and significant contributions to the prediction of the amount of work students put into their various courses. (They accounted for from between 10 and 33 per cent of the variation in effort-allocations.)

The analysis of exchange systems via canonical correlations indicated that primary exchanges accounted for from between 26 to 52 per cent of the exchanges between professors and students in the four cohorts, while the secondary exchanges accounted for from 28 to 45 per cent. For course-student exchanges, the data indicated that both primary and secondary exchanges were relevant. In addition, the canonical correlations produced relatively high R's allowing us to tentatively conclude that the exchange systems were tending toward equilibrium. Further, the analysis provided some evidence for the idea that a major way in which exchanges between various components in a system maintain equilibrious relations is through secondary exchanges.

In general, then, the research provides inductive evidence for the modified theory of exchange that was proposed. We were able to account for a good deal of the behavior which we sought to explain.

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